CRANFIELD UNIVERSITY

Edward A. Barrows, Jr.

How Firms in Turbulent Environments Measure Strategic Performance

School of Management

DBA Thesis
Academic year: 2005-2014

Supervisors: Dr. Veronica Martinez and Professor Andy Neely

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This thesis is submitted in partial fulfillment of the requirement for the degree of Doctor of Business Administration

1. Linking Document

1.1 Abstract

This thesis presents the findings from two case study examinations of strategic performance measurement systems within two turbulent environmental contexts: the U.S. security software industry and the U.S. health care industry.

Despite a three-decade emphasis on performance measurement research, little empirical work has been carried out inside turbulent settings—contexts characterized by rapid change, high levels of instability and complex configurations among environmental variables. This research targets that gap. Through exploratory case studies from seven security software firms paired with a single in-depth case investigation within a transforming health care system, this study addresses the question: *"how do firms in turbulent environments measure strategic performance?"* The research found that in turbulent environments, an effective strategic performance measurement system contains six interrelated elements: management aims, performance objectives, uncertainty areas, decision data, management attention and performance measures. Top managers focus on their aims and performance objectives to meet requirements via a closed-loop approach while monitoring uncertainty areas and gathering decision data in an open-loop way. This union of feedback and feedforward control enables dynamic interaction among the various elements of the system all of which are informed by performance measure data. Effective use is moderated by management's focus of attention.

The research has implications for information processing and management control literature; it extends existing theory to incorporate the use of semi-structures within the framework of the strategic performance measurement system as a means of overcoming the challenges of uncertainty. Further, the research contradicts both extant literature and practice convention that claims strategic performance measurement frameworks need to be balanced to be effective. Practitioners are provided with a strategic performance measurement framework for use in turbulent environments. The framework would benefit from further examination in a variety of different, equally turbulent, contexts.

Keywords: cybernetics, information processing, management attention, management control, strategic control, strategic performance measurement.

Acknowledgements

I would like to express my sincere appreciation to my supervisors Dr. Veronica Martinez and Professor Andy Neely and my panel chair Professor Mark Jenkins. Their support was instrumental in guiding my thinking and I feel privileged to have studied with such world-class scholars. I would also like to thank my cohort leader Professor Hugh Wilson who provided inspiration throughout the DBA process.

I am indebted to the Cranfield faculty and staff who supported me during the program. Barbara Birtles and Alison Wilkerson delivered exceptional support, as did Heather Woodfield and the entire library staff. I am also thankful for the friendship of my cohort colleagues Gabriella Alvarez, Heather Stebbings, Andrew Schuster and Raied Abdul-karim. Their intellect and humor made the course not only challenging, but also fun.

I am grateful for the support I received at my research sites. While I cannot mention the names of the people involved with my technology inquiry, if it weren't for their assistance I wouldn't have generated the findings I did. At Care New England, I am especially thankful for the support of Dennis Keefe and the entire ELT. Their willingness to help was fantastic and was a major reason behind why this study came together. Also, I would like to recognize Fran Giatas whose smile and good nature was exceeded only by her skill in gathering data.

My Goonan Performance Strategies colleagues deserve a special thank you for their patience during thesis completion. Dr. Kate Goonan provided encouragement while Trish Stoltz lent incredible review support. Without them this thesis would never have been possible.

Drs. Robert Kaplan and David Norton deserve special mention for their mentorship while I worked at Balanced Scorecard Collaborative/Palladium as well as for their contribution to management, the extent of which I didn't fully appreciate until now.

Lastly, I would like to thank my children: Henry, Hannah, Hugh and Howard. Because of my desire to make this contribution, they gave up countless hours with their father that they'll never recapture. I promise not to forget their sacrifice and to somehow return that which I have taken from them. The starting point is the dedication of this thesis to them.

Table of Contents

List of Figures

List of Tables

1.2. Introduction

We shall not cease from exploration, and the end of all our exploring will be to arrive where we started and know the place for the first time.

T. S. Eliot

1.2.1. Background

The Linking Document synthesizes findings from three separate research projects and describes what should be a contribution to both management theory and practice regarding how firms operating in turbulent environments can improve strategic performance measurement—a major challenge for firms today. The Linking Document explains the logic underlying the research, describes the research process and separate products, and presents the final model—the penultimate output of the multi-project effort—along with links to the relevant research and a description of its specific contribution and associated limitations. The thesis comprises four main sections.

1.2.1.1. Linking Document

The Linking Document provides a summary of the findings from each of the three empirical projects. The overall research question, context, and approach are presented. The philosophical and methodological foundation of the thesis is discussed. Summaries of each of the projects are highlighted along with key findings. A meta-analysis and synthesis generates a set of final conclusions leading to the specific contributions to research and practice. Limitations of the thesis along with directions for future research are provided.

1.2.1.2. Project 1: Systematic Literature Review

Project 1 is a literature review conducted by systematic means. The research questions asked of the literature are presented along with an initial discussion of the three themes of literature to be analyzed: turbulent environments, strategy and performance measurement, and management. The literature review methodology and strategy are discussed and the thematic findings are presented by subset within each of the three literature domains. The initial inquiry questions are addressed in the final section and a synthesis of findings are presented in the form of an analytical framework that serves as the backdrop for Project 2.

1.2.1.3. Project 2: Strategic Performance Measurement in a Turbulent Environment: Evidence from Security Software Firms.

Project 2 is a study of seven firms in the U.S. security software industry—a historically turbulent industry setting. Following the literature summary, research questions and the research method—exploratory case analysis—is presented. The research sites, research method and data collection approach is discussed. Data analysis is presented sequentially by research question highlighting findings across the set of firms which focused on understanding the strategic performance measures used, the strategic performance measurement roles played and process employed, factors that affect the design of the strategic performance measurement system as well as an analysis of how strategic performance measures inform strategic decisions. The project concludes with synthesis of the findings in the form of research propositions and a preliminary model of strategic performance measurement in turbulent environments. The propositions and model serve as the starting point for Project 3.

1.2.1.4. Project 3: Strategic Performance Measurement in a Turbulent Environment: Findings from a Transforming Health Care System

Project 3 is an examination of the propositions and model developed in Project 2 in a different industry context—the U.S. health care industry. An in-depth case study of a single firm was the site selected to explore the fitness of the propositions and research model in a context that has become turbulent only recently. Following another literature summary, research questions, research concepts, and the research propositions and model are highlighted. Research questions are developed. The research method—case analysis for refinement purposes—is presented. Data collection and analysis is provided within the context of the research questions. The study's conclusions are found in an updated research model paired with contributions and limitations.

1.2.2. Research Rationale

Research in the area of performance measurement is by no means new—as an area of academic study it began in earnest in the late 1980s (Busi and Bititci, 2006). However, retrospective views of the practice of performance measurement trace the roots of the discipline back to ancient times when the first systems of commerce and double-entry accounting were developed (Johnson, 1981). The field began a

practical formalization during the Industrial Revolution that eventually led to improvement in knowledge and practices; evolution continued steadily onward into the modern era, with the development of the most fundamental perspectives in the field (Anthony, 1965).

Yet challenges within the field persist despite calls for outright revolution (Eccles, 1991), intensive study of individual performance measurement practices (Neely et al., 1995), development of integrated performance measurement frameworks (Lynch and Cross, 1991; Fitzgerald et al., 1991; Kaplan and Norton, 1992), construction of applicable theory (Schreyogg and Steinmann, 1987; Simons, 1995), creation of comprehensive management control systems (Anthony and Govindarajan, 2001), and acknowledgement of contemporary performance measurement frameworks (Franco-Santos et al, 2012). Paradoxically, some scholars note that in spite of demonstrable progress, many of the same themes of discussion that took place decades ago are still alive and well today (Neely, 2005).

An unfortunate byproduct of inconsistencies in both research and practice is that managers engage in performance measurement activities that generate unintended, if not outright perverse, consequences. Budgets can—and do—drive managers to engage in behaviors that are at cross purposes with firm objectives, a challenge noted by Ridgway (1956) in the first edition of *Administrative Sciences Quarterly*. Overemphasis of a short-term performance orientation can lead to catastrophic results; the 2008 financial crisis was caused in large part by lax lending practices aimed at meeting the global financial market's demand for collateralized mortgage securities. Yet, researchers highlighted the perils of this kind of myopic performance measurement focus 30 years earlier, during late 1970s, when domestic manufacturing was in rapid decline due to pressures from Japanese competition (Banks and Wheelwright, 1979; Hayes and Abernathy, 1980). More recently, the value of balanced performance measurement systems—first proposed by Drucker (1954) and made popular by Kaplan and Norton's Balanced Scorecard (1992)—is still being questioned. As two strategic performance measurement researchers recently noted, "In spite of decades of research in this area, evidence on the benefits and limits of strategic performance measurement is still inconclusive" (Micheli and Manzoni, 2010, p. 466). This is a sobering perspective given the intensity of the research effort in the field (Neely, 1999).

In 2010, *Long Range Planning* published a special edition dedicated entirely to the topic of strategic performance measurement. In the overview article, guest editors Micheli and Manzoni present a series of questions that they consider fundamental to the advancement of the theory and practice of strategic performance measurement:

1. "What are the roles of strategic performance measurement in organizations?
2. Which factors should be considered while designing and using strategic performance measurement systems?
3. Is strategic performance measurement wedded to a specific paradigm?
4. Can strategic performance measurement only be aimed at promoting strategic alignment, or could it play an active role in shaping strategy and supporting empowerment and continuous adaptation?" (Micheli and Manzoni, 2010, p. 469).

Further into their commentary, they highlight the challenges associated with strategic performance measurement in dynamic environments. They summarize research claims that strategic performance measurement systems may become rigid and ossified when comprised of large numbers of indicators. They note, "This may not be a major problem or organizations competing in relatively stable markets, but it could become a serious issue for firms operating in very dynamic environments" (Micheli and Manzoni, 2010, p. 471). Interestingly, this statement is similar to one made by Goold and Quinn almost 25 years before when they note that "in businesses that face high turbulence and a low ability to establish precisely measureable strategic objectives, the value of a strategic control system would be problematic." (Goold and Quinn, 1990, p. 55). These perspectives provide the rationale for this thesis.

Despite the decades of research in the area of performance measurement, little is known regarding strategic performance measurement systems in turbulent environments. The literature review described in Project 1 shows that little existing literature explores this gap. This study contributes specifically to this area by identifying the factors that influence the elements and the design features of a strategic performance measurement system for turbulent environments.

1.2.3. Research Context

The studies conducted in the three projects described herein provide insights into how strategic performance measurement systems operate in turbulent

environments. Turbulent environments are those in which change is rapid speed wise, dynamic with regard to the level of instability and complex from the standpoint of the number of variables either individually or in combination driving the change. Evidence indicates that the environments within which organizations operate today are becoming increasingly volatile (Comin and Mulani, 2006). The presence of turbulent conditions makes accurate interpretation of environmental signals difficult for top managers. This in turn hampers their ability to make effective strategic decisions regarding firm positioning. An analysis of 500 publicly traded firms from 1955 to 2000 found that 87% stalled at least once during the period resulting in an average loss of 74% of market capitalization during the decade following the stall (Olson et al., 2008). The firms included in this study spanned a wide variety of industries and reflected firms of various ages, suggesting that growing industry turbulence is not a phenomenon isolated to a handful of settings alone. With that background, two significantly turbulent industries were chosen in which to conduct the studies.

The first setting was the security software industry within the United States. A sub-segment of the overall technology space, the security software industry "comprises companies that design, develop, publish, and support software used to monitor and protect data" (Hoovers, 2014). Technology security has become one of the most closely followed industries globally with the emergence of ongoing hostile attacks from criminal and in some cases foreign government intelligence organizations. As an example, Target, the U.S. retail giant, experienced a network breach from November 27 to December 18, 2013, that provided hackers with information associated with 40 million credit and debit cards. The cost to Target is estimated at $61 million. Security firms of all sizes are scrambling to developed services and products aimed at stemming this growing threat to global commerce. With new firms starting as established firms work to maintain dominance coupled with the emergence of new security threats, this setting provided a rich atmosphere in which to explore strategic performance measurement. To do so, a selection of seven firms was drawn largely from the Massachusetts technology corridor, for the purposes of evaluating their strategic performance measurement practices. The firms selected ranged from smaller, early stage firms with approximately $10 million in revenue to industry leaders with upward of $500 million in revenue. This variety of firms enables the examination of strategic performance measurement systems at various stages of maturing and sophistication.

The second setting was the United States health care industry. The health care industry in America is estimated at $2.5 trillion in total and expected to exceed 17% of gross domestic product if current projections prove accurate. Given the mounting pressures to provide more affordable care while simultaneously extending health benefits to the entire population, the United States federal government passed into law the Patient Protection and Affordable Care Act in March 2010. Better known as Obama care, this legislation—coupled with pressures from large insurers both public and private—has triggered a landslide of change within an industry that had been relatively stable for a number of decades. Payers are making demands on providers to deliver better, more affordable care; patients are demanding improved health outcomes for their spend; health care systems are struggling to adapt to a shift in their business models from being reimbursed for each individual service provided to one that is essentially a fixed-rate payment structure. At the same time, private equity firms are entering the market for purposes of creating consolidated health care systems. This places individual hospitals at a major disadvantage from a capital standpoint. Thus, the requirements of industry participants to improve care delivery quality, while also meeting mounting competitive pressures, regulatory requirements, capital constraints, and customer demands, highlight how the care delivery portion of the industry provided an ideal setting for a study of a strategic performance measurement systems. To accomplish this, an in-depth case study was conducted in a five unit health care delivery system in Rhode Island—a state that is a microcosm of the challenges associated with health care reform. This case offered a unique opportunity to extensively explore the early-stage use and refinement of a strategic performance measurement system within a firm that was the byproduct of an industry consolidation.

These two industries were chosen in order to contrast one industry that has experienced high levels of turbulence for many years with one where increased turbulence has been a more recent phenomenon. For over two decades, the high technology sector has been the focus of numerous influential studies specifically related to the effects of turbulence or various dimensions of it (Eisenhardt, 1989b; Brown and Eisenhardt, 1997). Further, because of the present challenges associated with data security, the security software segment provided a timely study site.

Health care is the more recently turbulent environment; as a result, there are limited inquiries into this setting (Grigoroudis et al., 2012). The advent of the Affordable Care Act has ushered in a raft of changes that are just beginning to take hold.

Although health care changes are sweeping the nation, the site selected for this thesis is an ideal location because it permits viewing the effects of these changes all within a single setting.

1.2.4. Definitions

Because the field of performance measurement is informed from a multidisciplinary perspective (e.g. financial accounting, management control, strategy, operations, human resource-based), it is essential to specify at the outset of the study the basic terms and definitions used throughout this research. As a compilation of three separate projects—one literature-based and two field-based—definitions germane to each study are contained within the body of each. That said, the terms defined here are those used consistently through the body of the thesis. Table 1-1 presents a summary of key terms along with their associated definitions and sources from pertinent literature.

Table 1-1: Key Study Terms and Definitions

Concept	Definition	References
Performance Measurement	The process of quantifying the efficiency and effectiveness of action.	Neely et al., 1995
Performance Measure	A metric used to quantify the efficiency and/or effectiveness of an action.	Neely et al., 1995
Performance Measurement System	The set of metrics used to quantify the efficiency and effectiveness of actions.	Neely et al., 1995; Bititci, et al., 1997; Bourne et al., 2003; Franco-Santos et al., 2007
Strategic Performance Measure	Strategic performance measures are performance measures that present managers with financial and non-financial measures covering different perspectives and in combination, provide a way of translating strategy into a coherent set of performance measures.	Bourne et al., 2003; Chenhall, 2005
Environmental Turbulence	Environmental turbulence is a gauge that reflects the magnitude of change for each variable as well as the rate of change for those variables. The greater the number of variables involved, the greater their level of change, and the greater the clockspeed of change, the higher the level of environmental turbulence.	Emery and Trist, 1965; Aldrich, 1979; Dess and Beard, 1984; Fine, 1998; McCarthy, et al., 2010
Critical	Operating environments are comprised of a	Emery and Trist, 1965;

Environmental Variables	number of underlying variables. Typical variables include technology, products/services, demand, regulatory issues, and competitive configuration. Not all variables are of equal gravity in terms of impacting industry participants—some have a greater effect than others. Critical environmental variables are those variables that have the most significant effect on the environment and its participants in particular.	Aldrich, 1979; Dess and Beard, 1984; McCarthy, et al., 2010
Firm Objectives	Discrete elements of an overall strategy that reflect essential actions the firm must achieve in order to be successful. Can also incorporate key success factors—attributes competencies, and capabilities that are seen as critical prerequisites for success of an organization in its industry at a certain point in time.	Otley, 1999; Ferreira and Otley, 2009
Management Attention	The items and issues of interest that firm decision-makers focus their attention on.	Ocasio, 1997
Strategic Decision	A strategic decision is one that is important in terms of the actions taken, the resources committed, or the precedents set. Strategic decisions typically involve strategic positioning, have high stakes, involve as many functions of the firm as possible and are considered representative of the process by which major decisions are made by the firm.	Eisenhardt, 1989b; Eisenhardt and Zbaracki, 1992

1.2.5. Research Approach and Research Questions

As referenced in Section 1.2.1, performance measurement and strategic performance measurement research are part of an ongoing research agenda in the field that includes the exploration of performance measurement systems in dynamic or changing environments (Neely, 2005; Micheli and Manzoni, 2010). Scholars note fundamental challenges with performance measurement ranging from understanding the dynamic relationship between strategy and control (Simons, 1990) to the basic definition of what a performance measurement system is and what features, roles, and process comprise one (Franco-Santos et al., 2007). In turbulent environments, significant change in areas such as new product introduction can occur in under a year, as has happened in the personal computer industry (Mendelson and Pillai, 1999). This rate of change creates persistent

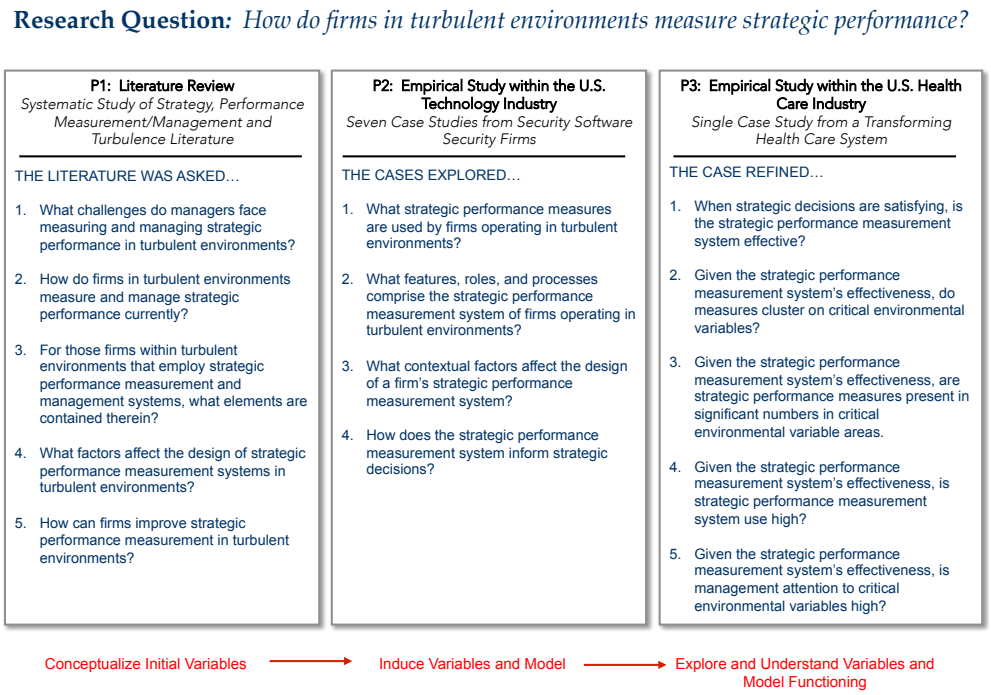
challenges for performance measurement systems, which can require up to 18 months to design and implement (Bourne et al., 2000).

Thus, the primary aim of this thesis is to gain an understanding of the impact turbulent environments have on strategic performance measurement practices and systems. Following an initial scoping study and a structured review of literature related to strategy, performance measurement and management, and turbulence, the following overarching research question was derived:

How do firms in turbulent environments measure strategic performance?

The thesis is comprised of a synoptic Linking Document and three sequential but interrelated empirical projects. The projects were carried out between 2007 and 2014. The research work was conducted alongside course work, independent study, and management consulting that was related to and supported the studies. Figure 1-1 presents on overview of the research question and depicts the relationship of the three empirical projects to one another through a high-level articulation of their aims and research progression. Sections 1.2.5.1 through 1.2.5.4 discuss the research questions, models, and research highlights.

Figure 1-1: Relationship of Research Question and Projects



1.2.5.1. Project 1 Overview

Project 1, presented in Section 2 of this thesis, is a comprehensive literature review stemming from an initial scoping study conducted within the three fields of strategy, performance measurement and management, and turbulence. Project 1 was, in actuality, an empirical study of the literature conducted using a systematic literature review methodology. The systematic review approach highlighted by Tranfield et al. (2003) provides an evidenced-based process from which relevant literature can be located and analyzed for purposes of gaining a comprehensive grounding in the theories and empirical studies that bound the field under investigation. The research was executed by identifying and conducting literature searches using terms relevant to the investigation. The details of the search, including the terms used, research technology employed, studies located and distilled, are presented in Section 2.7.2 Literature Review Methodology. Once the final set of literature was identified, each piece was critically examined to gain an understanding of the content of the study, theory, or review; the methods used; and the major contribution of that piece of literature to the field. The literature was then used to address the following research questions identified at the outset of the systematic review:

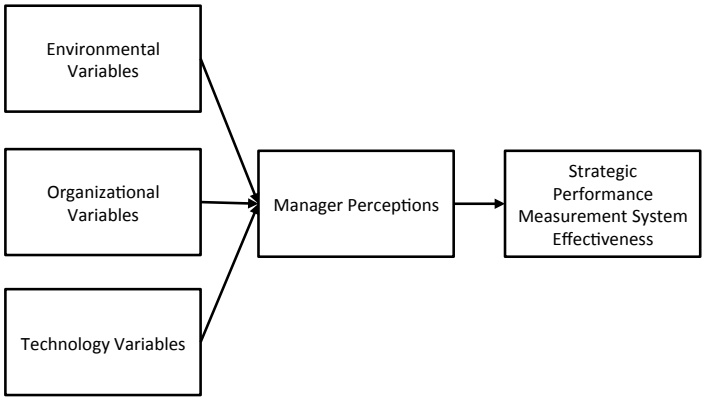
1. What challenges do managers face measuring and managing strategic performance in turbulent environments?
2. How do firms in turbulent environments measure and manage strategic performance currently?
3. For those firms within turbulent environments that employ strategic performance measurement and management systems, what elements are contained therein?
4. What factors affect the design of strategic performance measurement systems in turbulent environments?
5. How can firms improve strategic performance measurement in turbulent environments?

The summary findings include acknowledgement that dynamism is increasing in the external environment based on a variety of factors, including increased competition and accelerating technology change (Brown and Eisenhardt, 1997). To cope with these changes, firms engage in more frequent planning and coordination activities (Brews and Purohit, 2007). However, planning is becoming more decentralized and

informal (Grant, 2003). Managers continue the search for more information to make decisions and a premium is placed on real-time data about their operations and their competitive environments (Eisenhardt, 1989b). Semi-structured and adaptive activities are used to help manage increasing complexity in the external environment (Brown and Eisenhardt, 1997; Beinhocker, 1999). As anticipated, details regarding how firms measure strategic performance in turbulent settings were not found.

The result of the systematic review was the identification of five variables assembled in a preliminary analytical framework that enabled exploration within a turbulent setting to commence. The initial framework is presented in Figure 1-2 and is repeated in Figure 2-6.

Figure 1-2: Project 1 Analytical Framework



The details of the study, along with the findings and conclusions, are presented in Section 2. At the completion of Project 1, questions 3, 4, and 5 and the analytical framework provided the starting point for Project 2.

1.2.5.2. Project 2 Overview

Project 2, highlighted in Section 3 of this document, is an empirical study conducted with seven firms in the security software industry based in the U.S. The case-based query uses the framework developed in Project 1 as the basis for an initial exploration of the strategic performance measurement practices and systems of these firms—all of which are operating in the same turbulent setting.

The purpose of the study within this setting was to better understand the composition and functioning of each firm's strategic performance measurement system. As such, the inquiry was guided by the following research questions germane to all firms in this setting:

1. What strategic performance measures are used by firms operating in turbulent environments?
2. What features, roles, and processes comprise the strategic performance measurement system of firms operating in turbulent environments?
3. What contextual factors affect the design of a firm's strategic performance measurement system?
4. How does the strategic performance measurement system inform strategic decisions?

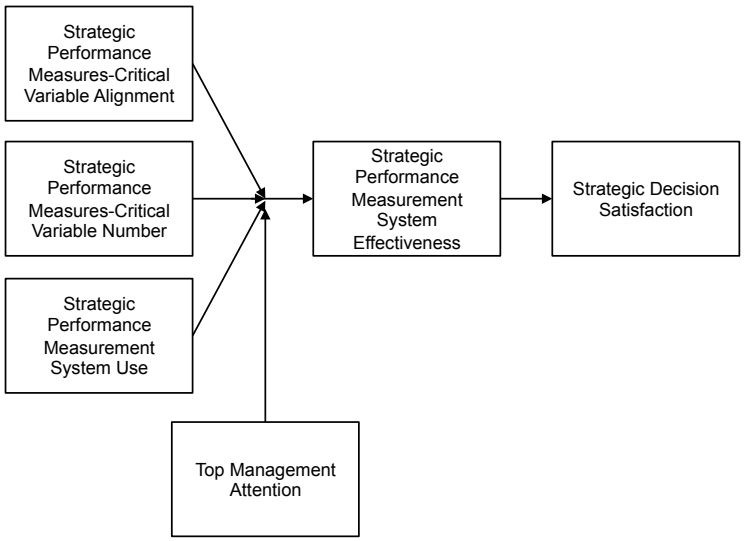
Chief financial officers were the primary informants, and information was solicited from them using a semi-structured interview format. When interviews were complete, archival data from published sources, such as annual reports and company websites, were added to facilitate the construction of firm-specific cases—narratives organized around the research questions with appropriate data displays contained therein. This technique is commonly used in qualitative research as it organizes rich, text-based descriptions into concise analytical pieces (Gersick, 1994). The cases were examined within and cross-case, which generated findings that included confirmation that performance measures clustered in depth on critical variable areas and that firm strategic objectives were not balanced—meaning they did not represent a distribution across a set of organizational dimensions (Kaplan and Norton, 1992; Neely et al., 2002). The strategic performance measurement system fulfilled six central roles consistent with Franco-Santos et al. (2007): manage strategy, measure performance, manage products, communicate performance, influence behavior, and adapt the organization. One other role emerged that was essential to the systems studied—detect signals from the market. In each organization, a signal-detecting mechanism was in place, but it was not used similarly in all study firms. Contextually, the most significant factor affecting the design of the strategic performance measurement system design was management aims. Use was a function of management attention. This finding was consistent with Simons's (1990) claim that managers make choices regarding how they use their management control systems—in some cases diagnostically to assess performance and others interactively to manage uncertainties. From the standpoint

of use, the strategic performance measurement system informed strategic decisions, but not directly, and firms that consulted with the strategic performance measurement system earlier and more often during their decision process enjoyed higher satisfaction levels with their decisions. The output of the study was a set of research propositions presented in Table 1-2 and a refined analytical framework shown in Figure 1-3. Table 1-2 is presented again in Sections 3.9.2 through 3.9.4, and Figure 1-3 is shown again in Figure 3-5.

Table 1-2: Study Research Propositions

Proposition 1: In turbulent environments, strategic performance measures will be clustered on critical environmental variables.
Proposition 2: In turbulent environments, strategic performance measures will be present in greater number in critical environmental variable areas.
Proposition 3: In turbulent environments, strategic objectives will be aligned to critical environmental variables.
Proposition 4: In turbulent environments, the focus of management's attention will be the primary factor affecting the orientation of the strategic performance measurement system.
Proposition 5: In turbulent environments, early and frequent use of strategic performance measures to inform strategic decisions will lead to higher decision satisfaction.

Figure 1-3: A Model of Strategic Performance Measurement in Turbulent Environments



Both the model and the propositions are used in Project 3 for purposes of exploring and refining their applicability in a different turbulent setting. The details of Project 2 along with the specific findings and conclusions are presented in Section 3.

1.2.5.3. Project 3 Overview

Project 3, discussed in Section 4 of this document, is an empirical study conducted within a single firm within the U.S. health care industry. Again, a case-based examination begins with the Project 2 research propositions presented in Table 1-2 and the model of strategic performance measurement in turbulent environments highlighted in Figure 1-3.

The purpose the Project 3 was further exploration of the model developed in Project 2 using a different, but equally turbulent, setting: the U.S. health care industry. This research site was selected because of its significant difference in age as a turbulent environment, industry structure, and key issues driving change. This not only helped refine the model, but also increased the model's validity. The investigation was guided by the following research questions:

1. When strategic decisions are satisfying, is the strategic performance measurement system effective?
2. Given the strategic performance measurement system's effectiveness, is there strategic performance measurement clustering on critical environmental variables?
3. Given the strategic performance measurement system's effectiveness, are strategic performance measures present in significant numbers in critical environmental areas?
4. Given the strategic performance measurement system's effectiveness, is strategic performance measurement system use high?
5. Given the strategic performance measurement system's effectiveness, is management attention to critical environmental variables high?

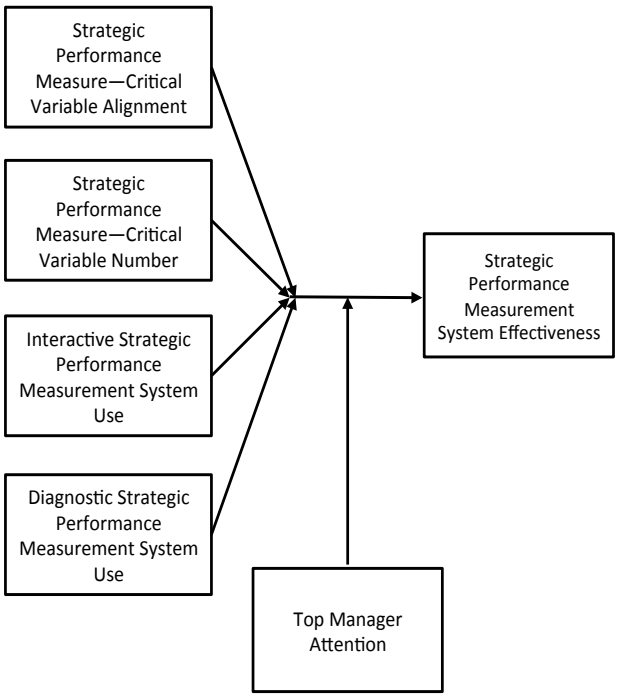
These five research questions were considerably more targeted that those presented in Projects 1 and 2 because the purpose of the study was not general exploration but rather a direct examination of the model's applicability in an alternate turbulent setting. And, unlike Project 2, which uses cases as a means to derive a set of variables, Project 3 uses case data as the basis to examine and refine the variables

contained within the framework. This approach was chosen as opposed to a survey or more quantitative evaluation because the purpose of the study was not exclusively testing but rather refinement stemming from exploring use in another setting. Cases are particularly adept at accomplishing this (Eisenhardt, 1989a).

Data collected included semi-structured interviews conducted with the entire top management team of the firm paired with questionnaire data gathered from the next layer of management below the top team. Further, archival data were gathered, including top-team meeting minutes and company newsletters. Lastly, direct observation of the top team was incorporated. Each variable within the analytical framework was contrasted to the data collected from the firm to determine where refinements were warranted.

The results of the study found that the strategic performance measurement system—in this case the Balanced Scorecard—did not inform strategic decision-making directly; it was used as a source of general performance information relative to critical objectives, but not as a source of decision information. Unique or decision specific data was sought in the case of each critical decision. The organization's critical objectives were oriented on major uncertainty areas as indicated by top leaders and measures presented in depth in those areas. Management attention to critical uncertainties was high as well. Contrary to Simons's (1995) assertion, the same strategic performance measurement system was used both diagnostically and interactively, by using different parts of the Balanced Scorecard for different purposes. Measures provided the means to assess performance relative to objectives while alignment and discussion of the objectives within the organization provided the mechanism for interactive use. The output from Project 3 was a final analytical model presented in Figure 1-4 and again in Figure 4-3.

Figure 1-4: Updated Model of Strategic Performance Measurement in Turbulent Environments



The three projects—while carried out independently—have been reviewed and normalized so that there is reasonable consistency across the studies. Still, because they were discrete investigations, there are modest differences across the set in terms of research structure, approach, and in some cases terminology. This does not impact the nature of the findings but more the form in which the findings are presented.

1.2.5.4. Linking Synopsis Overview

This synoptic paper, known as the Linking Document, synthesizes the findings of the three projects relative to the overall research question posed in Section 1.2.5. The purpose is not only to summarize the findings but more importantly, to present them in such as way that the contributions to theory and management practice are clear and the written requirements of the doctoral course of study are fulfilled.

The Linking Document is organized as follows: introduction in Section 1.2, methodological overview in Section 1.3, literature update in Section 1.4, research findings and discussion in Section 1.5, conclusions in Section 1.6, validity of the study

in Section 1.7, limitations in Section 1.8, and future research opportunities in Section 1.9.

1.3. Methodological Overview

An essential element of any research is statement of the purpose of the research. Further, identification of the research's purposes aids in the identification of the appropriate philosophical position that will guide the researcher in the conduct of the research. Each of these is discussed in turn in Sections 1.3.1 through 1.3.3.

1.3.1. Research Objective

It is generally accepted by scholars that the field of performance measurement has yet to mature as an area of study. Some of this stems from the discipline's relative immaturity, since it was established during the late 1980s (Busi and Bititci, 2006). Others suggest that it is because of conflict that exists regarding the findings identified to date and disagreement over the benefits and limitations of performance measurement in general (Micheli and Manzoni, 2010). But a more critical view is that field lacks the theoretical foundation necessary to give it academic credibility (Neely, 2005). As Ferreira and Otley (2009) note, "The literature in the area of performance management systems and management control systems increasingly recognizes the need for research to be based on more coherent theoretical foundations" (Ferreira and Otley, 2009, p. 263). Which—intentionally—is the main objective of this research: identification of a mid-range theory that can be used by researchers for purposes of advancing the field performance measurement as a bona fide area of management inquiry. Related to that purpose, the theory should aid managers in the design of a performance measurement system that helps them direct their firm's activity in a turbulent setting.

To accomplish this task, it is essential to identify what constitutes a theory. Whetten (1989), in his paper "What Constitutes a Theoretical Contribution?," notes that a "complete theory must contain four essential elements" (Whetten, 1989, p. 490):

1. Description of "what"—those factors such as variables, constructs or concepts that partially explain the phenomena of interest;
2. Clarification of "how"—an explanation of the relationships of the factors to one another;

3. Justification of "why"—rationale regarding the economic, psychological, social, technological reasoning underpinning the causal relationships; and
4. Limitations of "who, where, and when"—temporal or contextual factors that bound the generalizability of the theory or model.

Each of these elements is manifest in the theoretical contribution that this study makes. The philosophical perspective that enabled the creation of the theory is articulated via the ontological and epistemological perspectives.

1.3.2. Ontological Perspective

This research takes on a contemporary ontological perspective; the adopted philosophical stance for purposes of this research is Realism. As Blaikie states, Realism is "an ontology of intransitive structures and mechanisms which are distinguished from the transitive concepts, theories and laws that are designed to describe them." These laws are descriptions of the real essences of things that exist in nature, such essences being their power or tendency to produce effects which can be observed" (Blaikie, 1993, p, 98). Realism takes that position that there is reality that exists whether or not it is observable by scientists through their empirical activities. Applied to the study, the findings from this research highlight a set of underlying structures and mechanisms that govern strategic performance measurement systems and that they are influenced by factors stemming from the environment and management behavior. It is the responsibility of the researcher to identify these factors and relationships so as to harness their explanatory power.

1.3.3. Epistemological Perspective

The Realist perspective postulates that there are mechanisms at work that produce observable phenomena. The researcher's aim then, is to move past the observable, through the domain of the actual, and into the realm of the real. This is accomplished through development of models that "if they were to exist and act in a postulated way, would account for the phenomena being examined." (Blaikie, 1993, p. 98). The outcome of this study is, in fact, a model that identifies the factors and relationships that collectively explain the functioning of a strategic performance measurement system in a turbulent setting.

1.3.4. Research Strategy

To operationalize these perspectives, this thesis adopts a retroductive research strategy (Blaikie, 1993). The retroductive process begins with taking stock of relationships among observable phenomena. However, since the Realist perspective posits there are underlying mechanisms that are not readily observable, models or hypothesis must be constructed that explain the factors and their operation. Following the model's development, experimental activity takes place that tests the model. In cases where the tests are successful, the model stands as reflection of the structures and mechanisms; in instances where testing is unsuccessful, the model is refined until it better fits the phenomena being investigated (Blaikie, 1993). As applied to this thesis, observable phenomena were initially identified during the researcher's management consulting work; Project 1 helped identify a model that was designed to reflect the underlying mechanisms; the model was tested in Project 2 and then further refined in Project 3.

1.3.5. Research Methods Summary

The research methods employed in the study incorporate the overall research objective, the philosophical position, and the research strategy in particular. Specifically, the research methods consist of an empirical review of literature review, followed by an exploratory, multiple case study investigation that was then refined by a single, in-depth case study project.

Project 1 is an empirical literature review conducted using a systematic literature review methodology. Section 1.3.1 discusses the existence of fragmented and, at times, conflict findings within the performance measurement and management literature. To offset the challenge this poses to a literature review, a systematic literature review was conducted. This evidence-based approach to literature examination is intended to ensure the researcher enhances his knowledge base while critically informing the research being conducted (Tranfield et al., 2003).

Within the literature areas of strategy, performance measurement and management and turbulence, the systematic literature review found few studies that resided at the immediate intersection. More commonly, the literature identified contained two of the three themes (e.g. strategy and performance measurement, strategy and turbulence) but not all three; as such, additional papers and books were suggested by the panel guiding the systematic review. Complete details on the methodology, the data sources, selection criteria and findings can be found in Section 2.7.2, Literature Review Methodology.

Project 2, which is the first field project, consists seven exploratory cases from the security software industry. Although case-study research does not sample in the traditional sense, the intent of the research was to examine a sufficient number of firms to reach theoretical saturation (Strauss and Corbin, 1998). Executives—namely chief financial officers—were interviewed in order to gain an understanding of how their firm's performance measurement and management processes operated. Particular attention was paid to the strategic portion of these processes. From each set of interviews, and added archival data, an analytical case was developed for each firm. Within-case and cross-case analysis was accomplished via the development of a series of data displays. The findings in Section 3 present the detailed results. Case study and analysis were used in Project 2 because of the exploratory nature of the research. In instances where a close connection between the researcher and the empirical context needs to be maintained, case studies provide an appropriate method of analysis (Yin, 2003). Further, Huberman and Miles cite Eisenhardt's perspective that, "case study research is a strategy that focuses on understanding the dynamic present within a single setting." (Huberman and Miles, 2002, p, 5).

Project 3 was a separate and distinct study from Project 2; however, it used the analytical framework identified at the completion of the earlier project as the starting point for further research in a different industry setting. Project 3 was carried out in the U.S. health care industry—a different but similarly turbulent environment. The U.S. health care industry with its variety of changes ranging from new legislation, new competitor entry, and increasing customer demand coupled with supplier pressures provided an excellent means to explore the effects of turbulence. The research site was a single health care delivery organization with five separate operating entities. A single site was chosen as a means to evaluate the framework in depth with a health care system that had only recently been established and was early in a transformation/integration process being led by a new chief executive. All 17 members of the top management team provided interview data, and the researcher had access to meetings of the top management team on a regular basis, as well as full access to the next level of leadership, including the chief executives of each of the five subordinate operating units. This provided a unique, internal perspective on the forces driving change as well as the management team's corresponding behavior. Unlike in Project 2, the purpose of which was to explore multiple firms across an industry, the intent of Project 3 was to refine the output of Project 2 in another setting, one that had only recently become turbulent. However,

detailed cases were not created; interview and archival data were collected in order to examine the applicability of each variable within the model in the new environment. The intent was to aid in determining which elements of the model were necessary conditions across multiple settings (Dul and Hak, 2008).

The progression and selection of studies—from literature review to two projects within turbulent settings—was chosen to provide the researcher with an in-depth understanding of how strategic performance measurement systems function in different turbulent settings—the overall purpose of the research. This choice of studying two turbulent settings was made instead of contrasting studies from a non-turbulent setting with a turbulent one because the results of the literature review indicated that there were no empirical studies available that enabled researchers to understand how strategic performance measurement systems function within turbulent environments (Neely, 2005). This suggested that an extensive exploration of the phenomenon within various turbulent settings would be of high value.

1.3.6. Research Sites

One of the main considerations in the research was selection of the research sites. The research sites—in this case, seven firms within the security software industry and a single hospital system within the health care industry—were selected for two similar reasons.

The first, and most critical selection criteria, was the prevailing level of turbulence within the industry environment. The security software industry in the United States is a subset of the overall technology space, which has proven to be highly turbulent throughout its history, especially in terms of new technology introduction and competitive activity (Bourgeois and Eisenhardt, 1988). In support of this view, during the study itself the following occurred within the study firms alone: two study firms were purchased—one by a strategic buyer and one by a private equity firm, two study firms merged with one another, one study firm purchased its largest competitor, and the remaining two study firms sold in total or in part to a foreign buyer. Rapid change and changes in competitive configuration are indicators of high turbulence (Fine, 1998; McCarthy et al., 2010). The health care industry in the United States has for approximately two decades enjoyed relative stability. However, the advent of the Affordable Care Act, the entry of private equity firms, and the growing presence of greater level of information transparency to patients have thrust into the realm of high turbulence. The entire industry is experiencing a

business model upheaval that consists of a shift away from insurers paying for discrete services (e.g. fee for service) to paying for value (e.g. global payments) (Porter and Lee, 2013). Specific to the study participants, each of the interviewees noted the pace and extent of change were dramatic, the most significant and fastest they had seen in their entire careers. Thus, both the security software and health care industries were deemed to be fertile research sites.

Secondly, within both of these settings were firms that allowed significant levels of access. ZBA and Care New England each provided access to key executives—executives who are arguably shaping the future of their respective industries. Further, both firms—and to a lesser extent the other firms in the security software industry—provided detailed information from their performance measurement systems. In case study research it is essential to get as close as possible to the phenomena of interest and given the nature of both environments, access was critical to the success of the study.

1.3.7. Data Collection Overview

Data were collected in both Project 2 and Project 3 using similar methods; however, the purposes and approaches were considerably different.

In Project 2, the study of seven security software firms within the United States, semi-structured interviews were conducted with each firm's chief financial officer. In one firm—ZBA—access to six executive officers was provided. In total, 13 interviews were conducted. Each interview was conducted in person or by phone using a voice recorder and lasted between 30 and 90 minutes. The purpose of these interviews was to gain as comprehensive a view as possible regarding how the firms measure strategic performance, how they construct their strategic performance measurement systems, and how they use these systems on a routine basis and more specifically, to inform strategic decisions. In Project 2, a major challenge with the study was confidentiality. Because of the proprietary nature of each firm's technology, the confidentiality of their strategic plans and partnership arrangements coupled with the proximity of the firms within the Massachusetts Technology Corridor, access was a major issue. Even when the initial interview was granted, in some cases the interviewee refused access to the rest of the management team based on the belief that what was shared during the interview could be considered trade secret. Ultimately, enough data were collected from interviews, website information, published financial reports, and company press releases to enable the

construction of comprehensive cases on every firm. The cases facilitated not only in-depth analysis for each firm but a comprehensive view in aggregate when examined cross firm. An example of a constructed case is contained in Section 6.5.

In Project 3, a single, in-depth case study of a large health care system in Rhode Island, semi-structured interviews were conducted with all 17 members of the organization's executive leadership team. Again, each interview was conducted in person or by phone using a voice recorder and lasted between 45 and 90 minutes. The purpose of these interviews was not exploration, but rather examination of which elements of the strategic performance measurement model presented in Figure 1-3 were present and in what form in a different, but equally turbulent setting. In addition to interviews with the top team, a short questionnaire was given to 50 members of the level below the top team; 30 members responded. This served to further assess the model's validity at an organizational echelon below that of the top team. Finally, supplemental data were collected for purposes of triangulating on the interview and questionnaire data: six months of weekly newsletters, one year of management meeting agendas, two years of year-end Balanced Scorecard performance results, two years of quality dashboard results, and selected data from the health care system's Malcolm Baldrige National Quality Award application. On two occasions, personal observation of top management team meetings took place as well. Additional information regarding data collection can be found in Sections 3.4.5 and 4.4.3.

1.3.8. Data Analysis Overview

Data analysis began similarly but then diverged to support the aims of the individual studies. Both Project 2 and Project 3 commenced with interviews with executives. Section 3.4.6 discussed the data analysis associated with Project 2 and Section 4.5 explains the data analysis completed for Project 3. In both studies, an interview protocol was developed for use with each member of the top team who was interviewed. Each interview was recorded using a digital voice recorder. As soon as possible after completion, interviews were transcribed using Dragon Naturally Speaking voice-recognition software. For both projects, this initiated the analysis process by enabling immersion in the details of the discussions (Lofland and Lofland, 1995). Each interview was then reviewed and reduced so that only the data from the interviewee were clearly identifiable. It is at this point where the analysis becomes specific to each project.

For Project 2, case exploration in the security software industry, interviews were organized into a firm-specific case structured by research question. To the emerging cases, archival data were added to create an analytical composite of each firm. The composites combined information regarding competitors, financial performance, and products with interview information from respondents. For example, trend information regarding firm financial performance was added to create a more robust presentation. Within the body of each case, data displays were then developed to facilitate analysis of the findings (Miles and Huberman, 1994). Within-case analysis was accomplished by reviewing the data by research question. Following several reviews of each case where marginal notes were made, case data—from the displays in particular—were assembled into a series of composites that promoted cross-case analysis. After analysis and review of the cross-case tabulations, selected literature was reviewed and the initial analytical framework was revisited. Findings and conclusions were drawn from the data at this point. These consolidated displays can be seen in Section 3.5 through 3.8, which show high numbers of performance measures clustering on critical objectives, discuss the six roles of the firms' strategic performance measurement systems, and discuss contextual factors—namely management aims—that influence the design and implementation of the firms' strategic performance measurement systems.

For Project 3, an in-depth case exploration in the health care industry, the interviews were analyzed for purposes of extracting information to further examine and refine each of the variables in the analytical framework articulated in the form of the research questions. To aid in the accomplishment of this, data displays were created that addressed the research questions and concepts directly. Displays were created that assessed the turbulence level and strategic performance measurement system effectiveness, each by aggregating managers' responses to questions regarding the environment and performance measurement system itself. In addition, archival data were gathered, analyzed, and assembled into data displays as well, again, for the purpose of examining each research question. Data displays were created that compared strategic performance measures to environmental uncertainties and contrasted environmental uncertainties to areas of management attention. Once data displays were created for each research question, the displays were cross-examined in search of areas of inconsistency. Literature was revisited and then findings and conclusions were advanced. These displays can be seen in Section 4.5, which identifies the environmental variables driving change in the industry, discusses the clustering of strategic performance on critical variables, shows the increased

number of performance measures on critical variables areas along with the diagnostic and interactive use of the Balanced Scorecard to measure (and manage) strategic performance.

1.3.9. Data Analysis Summary

This section provides a meta-analysis of the three projects contained in the thesis by summarizing the research questions that guided each project and the high level findings for each of the questions. This information is presented in Table 1-3: Thesis Meta-Analysis.

Table 1-3: Thesis Meta-Analysis

Project 1	Q1: What challenges do managers face measuring and managing strategic performance in turbulent environments?	The rate of change and the magnitude of change are increasing, making environments more complex to navigate. Changes in technology and competitors are causing much of the turbulence. Planning and coordination activities increase, but are more informal and decentralized. Managers need more information to make higher risk decisions but they are bounded in their ability to process this information.
	Q2: How do firms in turbulent environments measure and mange strategic performance currently?	Literature says little about strategic performance measurement in turbulent settings. Performance measurement and management is less formal and more decentralized than in stable settings. Managers' focus on controlling their strategic priorities.
	Q3: For those firms within turbulent environments that employ strategic performance measurement and management systems, what elements are contained therein?	Firms in turbulent environments have strategies that may or may not be formalized; they have goals and/or objectives, performance measures, programs, and links to compensation. Schreyogg and Steinmann's (1987) model of strategic control and Simons's Levers of Control (1995) are theories that may explain functioning of strategic performance management systems however it is unclear the extent to which they apply in turbulent settings.
	Q4: What factors affect the design of strategic performance measurement systems in turbulent environments?	Four factors affect the design of strategic performance measurement systems in a turbulent environment: environmental factors, organizational factors, technology factors, and management perceptions.
	Q5: How can firms improve strategic performance measurement in turbulent environments?	Three actions managers can take to improve their strategic performance measurement and management activities are: first, understand the variables that are causing turbulence and assess their level of volatility;

		second, draw from existing control theory such as Schreyogg and Steinmann (1987) or Simons (1995) to aid in designing strategic measurement systems; third, establish a means to evaluation environmental variables in an ongoing manner.
Project 2	Q1: What strategic performance measures are used by firms operating in turbulent environments?	Strategic performance measures were linked to critical objectives such as revenues, customer behavior, and expenses. Measures were not balanced; they were clustered in depth in critical objective areas. They presented in significant number in areas of critical objectives areas.
	Q2: What features, roles, and processes comprise the strategic performance measurement system of firms operating in turbulent environments?	Each system contained a set of performance measures and a reporting infrastructure. Additionally, functional plans and a set of strategic objectives were found in every firm. Every firm utilized a customer interaction component—a means of maintaining through measurement or action—a mechanism to monitor customer behavior. Six other roles were found: manage strategy, measure performance, manage products, communicate performance, influence behavior, adapt the organization.
	Q3: What contextual factors affect the design of a firm's strategic performance measurement systems?	Strategic performance measurement systems were affected by three internal factors and one external factor. Top management aims, board of director aims, culture comprised the internal factors; customer requirements was the external factor. The most significant was management's aims.
	Q4: How does the strategic performance measurement system inform strategic decisions?	Firms that used the strategic performance measurement system earlier and more often in their decision-making enjoyed higher satisfaction levels than those that did not.
Project 3	Q1: When strategic decisions are satisfying, is the strategic performance measurement system effective?	Partially. When strategic decisions were satisfying, the strategic performance measurement system was 'somewhat effective.' There was no direct link found between decision satisfaction and the effectiveness of the strategic performance measurement system. Top managers sought decision-specific information when it was needed.
	Q2: Given the strategic performance measurement system's effectiveness, are strategic performance measures clustering on critical environmental variables?	When the strategic performance measurement system was seen as 'somewhat effective', there was clustering of measures on critical variables. In the case, 72% and 70% of strategic performance measures clustered on five critical variables identified by the top team as the ones driving industry change.
	Q3: Given the strategic	When the strategic performance measurement system

	performance management system's effectiveness, are strategic performance measures present in significant numbers in critical environmental variable areas?	was seen as 'somewhat effective', there was clustering of measures on critical variables. For the top two variables driving change, 49% of strategic performance measures presented on the variables. Further, operational dashboards were developed which comprised in depth operational measures in both of these areas.
	Q4: Given the strategic performance measurement system's effectiveness, is strategic performance measurement system use high?	When the strategic performance measurement system was seen as 'somewhat effective', usage was found to be low. During the period examined, the strategic performance measurement system was only reviewed twice by the top team out of 16 formal meetings. However, during the 16 formal meetings, 33 times topics pertaining to key measures and objectives on the strategic performance measurement system were discussed.
	Q5: Given the strategic performance management system's effectiveness, is management attention to critical environmental variables high?	When the strategic performance measurement system was seen as 'somewhat effective', management's attention to critical variables was high. Interviews and questionnaire data confirmed that management was focused on critical variables and a review of CEO communications found that on 17 of 26 occasions direct communication to the entire workforce via the organization's newsletter included to topics related to the strategic performance measurement system.

Project 1, the systematic review of literature, finds little literature that informs the research question directly. What is known is the environment in which most firms operate is becoming increasingly difficult to navigate due to technology and competitive changes. To combat these changes, managers are planning and coordinating more frequently albeit in more informal and decentralized ways. They seek more information to inform their decisions but remain limited in their ability to process this information effectively. Turbulent environments draw from existing control theory—Simons's (1995) Levers of Control framework in particular, but it is not clear how effective it is in this setting. Factors that affect strategic performance measurement frameworks include environmental, organizational, and technology factors as well as management perceptions. To cope with increased turbulence managers focus their attention on critical variables versus all potential variables affecting their firms.

In Project 2, the analysis of seven security software firms found that measures are linked to critical performance objectives such as revenue growth, customer behavior

and expense management. Firms' objectives and measures were not balanced in nature; they were clustered in depth on critical variables. Further, there were more measures in these areas than anywhere else. Each firm had strategic performance measures coupled with a reporting infrastructure, a set of strategic objectives and a customer interaction component—measures relating to customers or a mechanism to stay in contact with customers that provided insights regarding customer wants and behaviors. They also had a set of functional plans—such as a sales forecast or product roadmap—however the content varied depending upon the individual firm's focus areas. The strategic performance measurement system filled six roles: manage strategy, measure performance, manage products, communicate performance, influence behavior, and adapt the organization. Further, strategic performance measurement systems were affected by three internal and one external factor: top management aims, board of director aims, and culture comprised the internal factors; customer requirements was the external factor. The most significant was top management's aims. Through the analysis of a set of each firms' strategic decisions, it was found that firms using the strategic performance measurement system earlier and more frequently experienced higher decision satisfaction levels than firms that did not rely as much on the strategic performance measurement system.

In Project 3, the in depth study of a five unit health care system in the midst of a transformation, it was found that the model from Project 2 held in the new setting but needed modification. When a set of satisfying strategic decisions was reviewed, it was found that the strategic performance measurement system was only deemed 'somewhat effective' by top managers. Further, there was no direct link between the strategic performance measurement system and decision-making or decision-satisfaction—the link was indirect. Strategic performance measures—in this case manifest within the Balanced Scorecard—were clustered on critical environmental variables. Further, a greater number of strategic performance measures were found in critical environmental areas than in other areas of performance. Usage of the system was not in keeping with regular patterns of use such as month or quarterly reviews; formal reviews were infrequent however the top management team regularly engaged in discussion regarding actions or activities linked directly to strategic performance measures and strategic objectives. Further, the CEO was focused on critical performance variables and his communications to the organization included a high frequency of topics linked to critical variables.

Regarding the overall research question regarding how firms in turbulent environments measure strategic performance, the following is found. First, strategic performance measurement systems may or may not be balanced in nature; more commonly they reflect measurement orientation on a narrow set of critical variables which themselves are aligned to uncertainty areas within the environment. A greater number of performance measures are found clustering in critical variable areas as well. Strategic performance measurement systems fill traditional roles such as managing strategy, measuring performance, managing products, communicating performance, influencing behavior, and adapting the organization however, systems are focused on key drivers of change like customer behavior so it plays a sensing and probing role as well. The overall design of the strategic performance measurement system is driven largely by management's aims and usage of the system is determined by management's intent. What the systems do is help top leaders orient attention on critical variables—performance based and uncertainty oriented—that must be managed in order to successfully meet overall firm goals.

1.4. Literature Update

In addition to the systematic literature review and literature discussions in Projects 2 and 3, more recent strategic performance measurement literature has been published that provides additional perspective on this thesis.

De Lima et al. (2009) summarize considerable performance measurement literature and identify the structural roles a strategic performance measurement system includes: (1) developing a closer understanding of customer need, (2) implementing strategic management functionality in the operations management system, (3) aiding in the development of a continuous improvement capability, (4) ensuring the performance management system incorporates a multi-horizon perspective, (5) defining the performance measurement framework, and (6) articulating strategy and measuring results using financial and non-financial measures. This short theoretical paper provides some additional roles beyond those outlined by Franco-Santos et al. (2007); however, it is written from the perspective of the operations management system, which limits its usefulness in informing this study. It does however suggest that a customer-needs element is part of the system, but is not specific regarding the design of it.

In addition to the four questions fundamental in advancing theory and practice in Section 1.2.2, Micheli and Manzoni (2010) note that the design and purpose of a

strategic performance measurement system are fundamental aspects that need to be taken into account if it is to positively contribute to organizational performance. Also, the design of the system needs to take into account the roles assigned to the system by the organization given it governs the types of indicators used by the system. Finally—for purposes of this study—the interplay between diagnostic and interactive uses of a strategic performance measurement system have consequences for both change and innovation strategies.

Concerned with the fragmentation and lack of comprehensiveness that is common in performance management research, Ferriera and Otley (2009) draw material from two field studies and two existing frameworks—Otley's (1999) performance management framework and Simons's (1995) Levers of Control framework—into one comprehensive performance management framework intended to help researchers take a more holistic view of the structure and function of performance management frameworks. The framework addresses contextual factors but only briefly stating that "literature has shown that variables relating to external environment, strategy, culture, organizational structure, size, technology, and ownership structure have an impact on control systems design and use" and that "the study of the operation of the performance management systems would require their consideration only if implicitly" (Ferriera and Otley, 2009, p. 267). The framework was useful in informing the study, but only partially because environmental factors were not key determinants in the model's design and use.

Tessier and Otley (2012), using concept analysis and existing literature, address vague definitions within Simons's (1995) Levers of Control framework and present a revised model that explicitly takes into account the dual enabling and constraining role played by controls and separates managerial intentions for control with employee perceptions of control. The revised framework also demonstrates that any control can be used either diagnostically or interactively and accounts for strategic performance controls and interactive controls separately.

In an empirical study of 349 Spanish banks, Gimbert et al. (2010) found that firms that use strategic performance measurement systems formulate strategy differently from those that do not. Their findings indicate a positive association between use of the strategic performance measurement system and the number and variety of strategic decisions that occur during strategic reviews. This, over time, shaped the nature of discussions and decisions that the top team makes and is consistent with

other literature that suggest mental frames change when new models—particularly cause-and-effect models—are implemented (Kaplan and Norton, 2000a).

Bisbe and Malagueno (2012) extend the work from Gimbert et al. (2010) and present findings from 267 Spanish banks, noting a positive association between strategic performance measurement systems and operational performance that is mediated by the comprehensiveness of decision arrays that the top management team uses; this relationship is negatively moderated in when environmental dynamism is high. They did not find evidence that there is a positive association between strategic performance measurement systems and comprehensive strategic decision arrays in highly dynamic environments. What they conclude is that independence exists between environmental dynamism and strategic performance measurement systems.

Franco-Santos et al. (2012) find from their review of 76 empirical studies that contemporary performance measurement systems—systems that contain financial and non-financial performance measures used to operationalize strategic objectives—play a central role in strategy, communication, and management processes that facilitate organization improvement. Further, these systems aid in the development, implementation, and review of business strategies by focusing discussions, decisions, and actions on strategic objectives. Comprehensive performance management systems also change the way in which leaders behave.

1.5. Research Findings and Discussion

The key research objective of this thesis was to gain a better understanding of how firms operating in turbulent environments measure strategic performance. To accomplish this, the findings are presented in four sequential but related stages. First, a meta-synthesis of each of the three projects is presents for purposes of identifying—from the research—the major contributions from each study and their complementarity that will be included in the final strategic performance measurement model. Second, each element of the model is discussed so that the component parts and the logic for their inclusion in the model can be described in detail. Third, the relationships and interconnectivity of the individual elements are described in order to show how they function as a system. Finally, the behaviors of those designing and using the system are discussed so that insight can be gained regarding implementation. At the same time, the findings are presented with the

forethought of what is required to make a meaning theoretical contribution consistent with Section 1.3.1.

1.5.1. Synthesis of Thesis Studies

In order to extract and contextualize the most important findings from each of the studies, a thesis synthesis was developed which is shown in Table 1.4. The synthesis is organized as follows: the research questions posed within each study are presented, the overall findings from the study related to the specific questions are shown, the evidence from literature or analysis from the study supporting the findings are highlighted along with implications and conclusions for each.

1-4: Thesis Synthesis

PROJECT 1: Literature Review			KEY SYNTHESIS POINTS	
Question	**Finding**	**Evidence**	**Implication**	**Conclusion**
What challenges do managers face measuring and managing strategic performance in turbulent environments?	Rate of change is increasing, enviornments are becoming more complex, planning is more decentralized, managers need more information to make decisions but they are boundedly rational and face processing challenges.	Fine, 1998; McCarthy et al, 2010; Galbraith, 1973; Simon, 1947	Rate of change is increasing; environments are becoming more complex, **managers need more information**; managers **struggle with decisions making due to bounded rationality**.	The strategic performance measurement system should be configured to gather information that is needed but not possessed within the traditional strategic performance management system. Managers bounded rationality should be taken into account.
How do firms in turbulent enviornments measure and manage strategic performance currently?	Literature says little about strategic performance measurement in turbulent settings. Performance measurement is less formal and more decentralized; managers focus on strategic priorities.	Grant, 2003	While little is known of strategic performance measurement systems, planning systems in general are more decentralized and are **focused on strategic priorities.**	The strategic performance measurement system should emphasize the measurement and ongoing evalution of priorities.
For those firms within turbulent envrionments that employ strategic performance measurement and management systems, what elements are contained therein?	Strategies may or may not be formalized, goals, objectives and measures exist. Links to compensation as well.	Schreyogg and Steinmann, 1989; Simons, 1995	Strategic performance measurement systems have **goals, objectives, and measures**. There are links to compensation as well.	The strategic performance measurement system should take into account goals, objectives and measures. Compensation--for purposes of this study--is considered outside the scope of the strategic performance measurement system as it is the domain of the strategic performance management system.
What factors affect the design of strategic performance measurement systems in turbulent environments?	Four factors primarily: 1) environmental factors; 2) organizational factors; 3) technology factors; 4) management perception.	Emery and Trist, 1965; Child, 1972; Aldrich, 1979; Dess and Beard, 1984; Duncan, 1976, Daft and MacIntosh, 197, El Sawy and Pauchant, 1988)	Four factors primarily: 1) **environmental factors**; 2) **organizational factors**; 3) technology factors; 4) **management perception.**	The strategic performance measurement system should factor in the environment (technology change being an example), the organization, and management perception.
How can firms improve strategic performance measurement in turbulent envrionments?	Three actions can improve strategic performance measurement: 1) understand variables driving turublence; 2) draw from existing control theory; 3) establish a means to monitor the environment in an ungoing way.	Dess and Beard, 1984; McCarthy, 2010, Brown and Eisenhardt, 1997; Simons, 1995, Bititci et al, 2000	Three actions can improve strategic performance measurement: 1) **understand variables driving turbulence; 2) draw from existing control theory; 3) establish a means to monitor the envrionment in an ungoing way.**	The drivers of turbulence should be considered within the model, existing control theory should be considered and a means to monitor the environment in an ongoing way should be incorporated.
PROJECT 2: Study of Seven Security Software Firms			KEY SYNTHESIS POINTS	
Question	**Finding**	**Evidence**	**Implication**	**Conclusion**
What strategic performance measures are used by firms operating in turbulent envrionments?	Performance mesures were linked to critical objectives: 1) Revenue, 2) Customer Behavior; 3) Expenses. Measures are not balanced across perspectives--they are clustered in signficant numbers on key variables.	Eisenhardt, 1989; Table 3-2: Performance Measure Composite; Table 3-3: Relationship of Key Business Objectives to Performance Measures	Performance measures **focused on critical objectives. Measures are not balanced.**	Strategic performance measures should be focused on critical objectives and priorities. This conclusion is consistent with the literature that states the focus on system design should be on managing critical priorities. Measures need not be balanced.
What features, roles, and processes comprise the strategic performance measurement system?	Elements: Performance measures and supporting infrastructure; functional plans and objectives; customer interaction component (monitoring), Roles (6): manage strategy, measure performance, manage products, communicate performance, influence behavior, adapt the firm	Franco Santos et al, 2007; Table 3-4: Featrues and Roles of Security Software Firms' Strategic Performance Measurement Systems; Figure 3-2: Generic Strategic Performance Measurement Process of Security	Peformance measuremenet systems performance a number of roles namely: **manage strategy, measure performance, manage products, communicate performance, influence behavior, adapt the firm, interact with customers. They also play a role in helping monitor the environment.**	The strategic performance measurement system should contain strategic objectives, performance measures that relate to functional performance areas and an uncertainty monitoring component--in the case organizations this was customer behavior and activity.
What contextual factors affect the design of a firms strategic performance measurement system?	Internal Factors: Top Management Aims, Board Aims, Culture; External Factors: Customer Requirements	Dess and Beard, 1984; Table 3-5: Environmenal Factors Affecting Strategic Performance Measurement Systems	Several factors affect the strategic performance measurement system: Top Management Aims, Board Aims, Culture; External Factors: Customer Requirements. **The most important one is management aims.**	The strategic performance measurement system will be most heavily influenced by management aims and will be a key determinant of the system design and use.
How does the strategic performance measurement system inform strategic decisions?	Firms that used the strategic performance measurement system more often and earlier enjoyed higher decision satisfaction levels.	Eisenhardt, 1989; Figure 3-4: Decision Activation	The study showed that firms using the strategic performance measurement system more often and earlier **enjoyed higher decision satisfaction levels.**	More frequent consultation of the strategic performance measurement system seems to lead to better decisions, thus, the design of the system should facilitate frequent use.

Table 1.4: Thesis Synthesis, Continued

PROJECT 3: Study of Health Care System			KEY SYNTHESIS POINTS	
Question	Finding	Evidence	Implication	Conclusion
When strategic decisions are satisfying, is the strategic performance measurement system effective?	System was "Somewhat Effective". No link between decision satisfaction and effectiveness of the strategic performance measurement system. Decision specific information was sought when necessary.	Table 4-8: Respondent Perspectives on Strategic Performance Measurement System Effectiveness	Strategic performance measurement system is considered partially effective even when not fully developed. **The system did not inform decisions directly.**	The strategic performance measurement system helps contextualize and inform decisions but not directly. Decision specific information is sought when needed to make specific decisions.
Given the strategic performance measurement system's effectiveness, are strategic performance measures clustering on critical environmental variables?	Clustering of performance measures on critical variables (72% and 70% of strategic performance measures clustered on five critical variables driving change).	Table 4-11: Respondent Perspectives on Critical Environmental Variables	Signficant **clustering of strategic performance measures on critical environmental variables.**	The strategic performance measurement system should be oriented on the most critical objectives and uncertainty areas.
Given the strategic performance measuremenet system's effectiveness, are strategic performance measures present in signficant numbers on critical environremntal variables?	Measures presented in depth on critical variables driving change (49% of measures presented on two key variables). Operational dashboards showed further depth in these areas.	Table 4-12: Alignment of Critical Enviornmental Variables with Balanced Scorecard Measures	M**easures present in depth on critical enviromental variables**	The strategic performance measurement system should be designed to collect as much information as is practicable regarding the most critical objectives and uncertainty areas.
Given the strategic performance measurement system's effectiveness, is strategic performance measurement system use high?	Usage was low in a formal sense (2 formal reviews out of 16 meetings); informal usage was high (33 time strategic performance measure system information--objective, initaitives, measures--were disussed during 16 meetings)	Table 4-15: Top-Team Executive Meeting Topics 2013; Table 4-16: Questionnaire Respontents' Assessment of Balanced Scorecard Use	Formal use was low (i.e. scheduled reviews of performance relative to targets); i**nformal use was high** in that the strategic performance measurement system elements and content were discussed frequently.	Strategic performance measurement system use contributes to system effectiveness. Use should contain a mix of formal and non formal uses consistent with both diagnostic and interactive control
Given the strategic performance measurement system's effectiveness, is management attention to critical environmental variables high?	Management attention to criticlal variables was high. On 17 of 26 occasions communication to the system included topics related to strategic performance measurement system.	Table 4-17: Care New England Newsletter Summary	**Management was focused on the contents of the strategic performance measurement systems and paid high attention to key aspects of it**--namely objectives, measures (to the extent they were available) and actions.	The strategic performance measurement system should enable top mangers to focus their attention on the most critical aspects of performance, namely, their own aims, key objectives and critical uncertainty areas.

1.5.1.2. Conclusions from Literature

Literature pertaining to strategy, strategic performance measurement and management systems and turbulence indicates that the environments within which firms are operating are becoming more complex and are changing at an accelerating rate (McCarthy et al, 2010; Fine, 1998). This increased complexity and accelerated pace of change challenges managers to make critical decisions because within this context they suffer from chronic information shortages (Galbraith, 1973). The most critical information they do need—information regarding uncertainties driving change—is not contained within the traditional strategic performance measurement system as these systems are closed-loop oriented designed around measuring objectives or elements of performance that are largely knowable and reasonably predictable (Kaplan and Norton, 1992). To aid in offsetting these difficulties, literature suggests that strategic performance measurement systems should be streamlined to focus on a narrow set of objectives and associated measures that reflect managers' highest priorities. The systems take on a flexible, less formal posture, to help managers' focus their attention on those variables that have the

greatest impact on their firm's performance. Further conclusions are listed in detail in Table 1.4 Thesis Synthesis.

The key findings from the literature review—summarized in the Key Synthesis Points of Table 1.4: Thesis Synthesis—will be carried into the design of strategic performance measurement systems for turbulent environments. The system should include objectives or goals and measures that enable top mangers to focus on their highest priorities. Further, the system should be oriented so that it facilitates gathering information that is needed but not possessed within the traditional strategic performance measurement system. This information will focus on the causes of turbulence or those factors that are driving change external to the organization; this will be incorporated into the model to enable the active monitoring of uncertainties that could potentially disrupt the business (Simons, 1995). This incorporation of uncertainties will enable a more dynamic approach to performance measurement by aiding in the sensing of important environmental changes for purposes of determining how the changes will impact the organization's strategic objectives (Bititci et al, 2000). Thus, the important elements of a strategic performance measurement model will include strategic objectives, focused measures as well as an external monitoring mechanism that helps detect environmental changes that could ultimately impact the firms strategic priorities or business model in general.

1.5.1.3. Conclusions from Empirical Studies

The field studies supported the findings from the literature review in large part but extended and added more specificity to the conclusions. As indicated in the literature, strategic performance measures should be focused on critical objectives—a finding consistent with research that indicates management should focus their efforts on measuring critical priorities. From the second project, each of the technology companies focused their measurement efforts on critical priorities identified by their top management teams—revenue growth, understanding customer behavior and managing expenses. The same was true in the study of the health care system; measures were focused on strategic objectives deemed critical to management: managing costs and delivering better value. Further, in these areas the system should enable the collection of a greater volume of measure information in an amount sufficient to help managers determine if their strategic objectives are being achieved. From both studies, higher volumes of measure information in the form of a greater number of measures were collected from key priority areas. Thus,

there are two main conclusions from the studies: first, strategic objectives should an explicit part of the strategic performance measurement model; and second, measures should be a key element of the model but should be clustered in critical priority areas.

The critical priority areas should encompass not only strategic objectives articulated by management but also main uncertainty areas; thus, the model should contain objectives specifically oriented on areas of uncertainty. This too was suggested in the literature and found in the empirical work. In the second project, the major uncertainty facing the study firms was changes in customer needs; in the third project the finding was cost pressures and better value. These areas reflected the preponderance of the strategic performance measurement effort. Thus, to be effective in turbulent settings, the strategic performance measurement system should contain strategic objectives and performance measures that relate to critical uncertainty areas. The research evidence shows that executives spent a significant amount of time reviewing these uncertainty areas in an effort to better understand them and assess the impact upon their firms. Therefore ongoing monitoring should be an element of the model. Sometimes the monitoring was through measures but in other cases it was through mechanisms such as sales teams, customer councils or industry events as was the case in the security software setting or through key partnerships as was evidenced in the healthcare case. Regardless of the specific mechanism chosen by top managers, uncertainty monitoring is an essential component of the model.

Literature suggested—and both studies confirmed—that the strategic performance measurement systems would be most heavily influenced by management aims. In the second project, where growth was critical, product sales and revenue overall was measured daily. When a new product launch was paramount, project milestone achievement was measured with high frequently. When cash management was essential, it was measured and monitored very closely. In the health care case, quality—a key determinant of value—was measured through an in-depth quality dashboard aggregating data from across all operating units. This focus was determined almost entirely by the aims and intent of top management. Management intent should therefore be a main consideration in the strategic performance measurement model.

In the study firms, information from the strategic performance measurement system was used to inform decisions but no evidence was found that indicated it informed decisions directly. What did happen in both studies when decision-specific information was needed was that top mangers conducted studies to find needed information in an effort to reduce the level of uncertainty faced when making a decision. In the health care firm, each of the three decisions analyzed was informed by specific searches for information, but not by information from the strategic performance measurement system directly. In the case of the software security firms, the same behavior was evidenced. This was a finding that was not expressly sought during the study but was logical given the activities embedded in decision-making. Thus, the model for strategic performance measurement in turbulent environments should contain an element that focuses specifically on gathering information specific to strategic decision-making.

In both of the empirical studies, the elements of the strategic performance measurement system focused on by top managers was largely determined by choices they made regarding where and how to direct their attention. As discussed previously, if revenue growth was a key focus area, then measures were collected in depth and with high frequency regarding revenue growth. When cost containment was critical, detailed cost data was collected. Both of these examples reflected choices managers made regarding the focus of their attention. Further, the frequency of use and the manner in which the strategic performance measurement system was used was again, determined by management attention. In the both studies diagnostic and interactive use was seen—consistent with Simons's Control Levers—however managers did not always use the strategic performance measurement system as Simons suggested. In the health care study, use of the Balanced Scorecard was both diagnostic and interactive a departure from Simons's findings. The conclusion from the empirical work is that management attention is a major moderator of both strategic performance measurement focus and use.

In summarizing the studies that comprise all of the research, the model for strategic performance measurement in turbulent environments should contain the following six elements: strategic objectives, management aims, uncertainty areas, decision studies, management attention and performance measures sufficient to provide insight to top managers regarding performance in each of these elements.

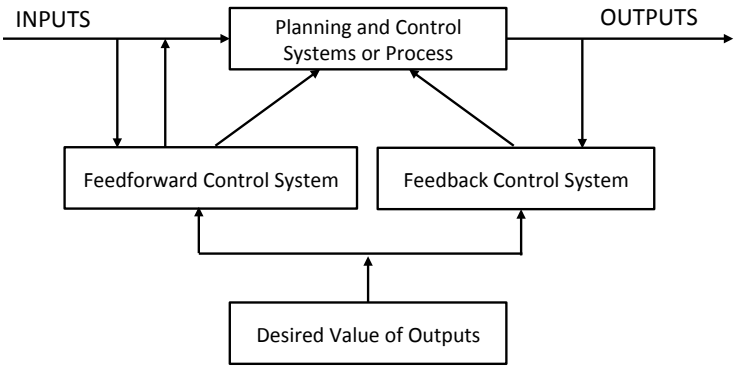
1.5.1.4. Theoretical Antecedents

This thesis draws on variety of essential theoretical viewpoints. At a high level, the findings are positioned within the area of Contingency Theory which, when applied to performance measurement, claims that there is no one best way to develop a strategic performance measurement system and that the design of the strategic performance measurement system will be contingent upon a variety of factors (Lawrence and Lorsch, 1967). In this thesis, the factors that influence the design of the system include the turbulence level within the operating environment and the aims and intent of management with respect to the design, focus of their attention and use of the system in particular.

At a more immediate level, the findings draw on Information Processing Theory that states, the greater uncertainty of the task, the greater the amount of information that has to be processed between decision-makers during its execution (Galbraith, 1973). Because the uncertainty level stemming from the environment is high in turbulent settings, more information is required to be processed among top mangers during the process of strategic performance measurement, as it pertains to strategic decision-making specifically. Uncertainty is an element of the model as is the decision-data needed to mitigate the sources of uncertainty.

Finally, the findings are situated directly within Control Theory, the science of cybernetics in particular. Figure 1.5 shows a feedback and feedforward control system, which provides a useful theoretical construct for the model—the elements listed in Section 1.5.1.3 specifically.

Figure 1-5: Feedback and Feedforward Control Systems (Koontz and Bradspies, 1972)



In the model shown in Figure 1.5, feedback is used to correct the planning and control systems or process based upon the output of the system. Most strategic performance measurement systems are designed in this closed-loop fashion with objectives serving as the variables from which associated measurement data provides information that enables control once it flows through the feedback loop. However, this isn't the only form of control in the system; feedforward control is the mechanism whereby correction to inputs into the process or system are made before processing occurs and outputs are generated. This minimizes undesirable variation given it occurs in advance of processing. This aspect of the model reflects an open-loop orientation. Combined with feedback control it provides a means to enable dynamic interaction through employing both open and closed-loop control.

The model proposed in the following section contains elements of both: feedback control regarding management aims and strategic objectives and feedforward control regarding the monitoring of uncertainties and results of decision studies that themselves are used to adjust inputs in the model. This design—drawing upon Contingency, Information Process and Control Theory—is new and is a specific contribution of this research.

1.5.2. What are the elements of a strategic performance measurement system in a turbulent environment?

This research shows that there are six elements to a strategic performance measurement system in a turbulent environment: (1) management aims, (2) performance objectives, (3) uncertainty areas, (4) decision data, (5) performance measures, and (6) management attention. Each one of these and their interrelationships is presented in Section 1.5.2.1 through 1.5.2.6 and then summarized in 1.5.2.7.

1.5.2.1. Management Aims

The design of any performance measurement system will be created consistent with the aims of management. Managers—top managers in particular—are the primary architects and consumers of the information that flows from the performance measurement system. Therefore, this model acknowledges that a clear understanding of their aims—stated or unstated—will be a key determinant of the system's design, use, and viability.

Often top management's aims are evident in the firm's vision and mission (Collins and Porras, 1996), written statements of strategy (Collis and Rukstad, 2008), or other associated planning documents. But even when that is not the case, the aims of management are the ultimate determinants of performance measurement system design and use. One of the most common phrases underlying all performance measurement systems is: "what gets measured, gets done." What this statement reflects is not so much an emphasis on measurement but on communication of top management's highest-level purpose and intent.

In Project 2 and in Project 3, strong evidence was found in every case supporting the influence senior management's aims had on the design and use of the strategic performance measurement system. From the design of specific performance measures themselves through creation of firm-specific dashboards to adoption of the Balanced Scorecard, top leaders were the single most significant determinant of the design and use of the strategic performance management system. More than just dictating design features and use choices, top managers influenced the focus and orientation of the system. In Project 2, ZBA's chief executive directed development of a dashboard that showed revenues and sales by region, country, product line, product, sales team to the level of granularity desired. The firm's revenue report even had a customized name—the Speed Report—and the report itself was provided to the senior management team daily. This focus on revenue growth aligned with the firm's stated strategic objectives of growing to $1 billion in revenue from its current performance level—which at the time of the case was just over half of that. This particular goal was considered very long-term and was thought of as more of a vision than anything else. It was widely understood by everyone and was a key driver of the performance measurement system, top-team focus, and supporting behaviors. In Project 3, the newly hired chief executive immediately implemented the Balanced Scorecard based on his desire to improve the focus of his management team and to align performance incentives around his most pressing priorities. Thus, the focus of the organization became not only the Balanced Scorecard, but the performance objectives and measures contained in it.

This view of understanding management aims is consistent with other views regarding performance measurement and management system design (Ferriera and Otley, 2009). And as Kaplan and Norton (2008) note in their book *The Execution Premium*, "Before formulating a strategy, managers need to agree on the company's purpose (mission), the internal compass that will guide its actions (values) and

aspiration for future results (vision)" (Kaplan and Norton, 2008, p. 37). But this finding is new, making management aims a distinct and separate component of the strategic performance measurement model. Previous research assumes that management aims are articulated as part of the performance measurement system expressly through the presentation of overall goals or high-level objectives (Otley, 1999; Kaplan and Norton, 2000b; Neely et al., 2002). But this is not necessarily the case; management's aims do not have to be aligned with organizational objectives. Making them an explicit part of the model highlights the level of alignment or, in some instances, misalignment with firm and environmental demands.

Management aims, explicitly stated or not, will ultimately have the most significant impact on the development of the strategic performance measurement model. Thus, management aims represent a critical element of the system.

1.5.2.2. Performance Objectives

Performance objectives are an essential element of the strategic performance measurement system in turbulent environments. Required performance goals are translated into a set of performance objectives or discrete dimensions of performance the firm must achieve. Previous performance measurement literature conflicts in some instances regarding their inclusion as part of a performance measurement framework (Otley, 1999; Franco-Santos et al., 2007). However, for the strategic performance measurement system in turbulent environment model, objectives are an essential element of the system.

Clear performance objectives, in some cases referred to as key factors (Ferreira and Otley, 2009) or goals (Kaplan and Norton, 1992), specify the performance improvement areas vital to the organization's future success. They translate top management's aims into discrete, actionable factors that communicate direction to the organization and serve as the basis for subsequent performance evaluation—either quantitatively or qualitatively. Franco-Santos et al. (2007) note that inclusion of strategic goals or objectives can be "problematic" (Franco-Santos et al., 2007, p. 796) and that performance measurement may not be linked expressly to strategic goals. This may be true from the standpoint of business performance measurement systems in general, but within the study firms, objectives were found to be a consistent element throughout.

In Project 2, each study firm's overall measure orientation was designed in concert with the firm's overall performance objectives. On occasions where growth was the priority, measures were focused on sales, market share, and new-product introduction timelines. In one firm, the management team was focused on growing the firm through customer penetration, and measures that focused on adoption rates were of critical importance not only to top management but also the board of directors. In Project 3, a major driver of the health care system's strategy was partnership development. A key performance objective was "Develop Strategic Partnerships"—an objective that was monitored personally by the chief executive.

As discussed earlier in this section, the literature conflicts regarding the inclusion of strategic objectives. This research shows that they are a central element of the model. But there is another finding that conflicts with the literature—objectives do not have to be balanced across a set of organization areas or perspectives, or associated with explicit causal models or maps, to be effective. This is different than previously published literature where balanced systems are advocated (Kaplan and Norton, 1992; Kaplan and Norton, 2000a). In Project 2, no firm used a balanced approach—objectives in all cases were clustered in a narrow set of areas that were linked to top management aims. In Project 3, the health care system did have a balanced set of objectives and measures. This finding leads to the conclusion that while objectives are a critical element of the model, they need not be balanced or part of an explicitly articulated causal map to be effective.

1.5.2.3. Uncertainty Areas

Turbulent environments, by their very nature, are rife with uncertainty. Much of the uncertainty is related to environmental change, which has been found to be punctuated in some cases (Romanelli and Tushman, 1994) and continuous in others (Brown and Eisenhardt, 1997). Further, the pace of change in turbulent environments is rapid (Fine, 1998). The number of variables undergoing change can be high and the degree to which they vacillate can be dramatic (McCarthy et al., 2010). The combination of these factors—rate of change, number of variables experiencing change, and the extent to which the variables themselves change—contributes to high levels of uncertainty for managers. If left unmonitored, these uncertainties can ultimately invalidate the intended business strategies of firms operating in this setting (Simons, 1995).

Galbraith (1973) defines uncertainty as "the difference between the amount of information required to perform a task and the amount of information already possessed by the organization" (Galbraith, 1973, p. 5). This means that as uncertainty levels increase, a rational management team will search for information, which is not possessed by the organization in order to improve its decision-making capacity. Again, per Galbraith: "the greater the task uncertainty, the greater the amount of information that must be processed among decision-makers during task execution in order to achieve a given level of performance" (Galbraith, 1973, p. 4). Achieving performance objectives, such as growing revenue or developing new products that will be accepted in a market is a complex task in a stable environment; it can be orders of magnitude more challenging in an uncertain one.

In the study, major uncertainty areas—changing customer requirements being the most common one for security software firms and cost pressures/demand for better value for the health care system—drove the focus of the strategic performance measurement system. Consistent with information processing theory, the search for additional information in these areas had the effect of orienting performance measurement system design on each major uncertainty. Three firms in Project 2 used data from customer trials to gain insights into how successfully new products were being accepted. In Project 3, a clustering of strategic objectives developed in the areas of better value and cost pressures that spread throughout the system, measures were aligned to them, which reflected almost half of the organization's strategic performance measures.

The management of uncertainty is a feature of management control systems, such as Simons's (1995) Levers of Control framework. What this research shows is that performance objectives can be formulated that align specifically with the management of uncertainty areas. Different from Simons, both the objectives and the measures associated with the uncertainty-aligned objectives provide the basis for interactive control—the objectives in particular. As an illustration, the health care organization enjoyed a tight alignment between the critical uncertainty areas and their strategic objectives. In cases where measures were not in place for the objectives, dialogue about the objectives and activities linked to the objectives enhanced top managers' understanding of uncertainties. This combined focus of strategic objectives and measures on uncertainty areas coupled with interactive and diagnostic use of both simultaneously, is new to strategic performance measurement systems.

1.5.2.4. Decision Data

Firms in turbulent settings—like firms in any setting—use information from their strategic performance measurement systems to facilitate decision making, but it is not done directly. Performance measurement information provides a backdrop—when paired with performance objectives especially—that aids mangers in determining whether or not their aims are being achieved. However, given the velocity of the environment and the inherent complexity therein, a need exists for unique information that cannot be located from inside the firm. In these instances, decision data must be sought.

In both projects, specific decision data was sought on occasions when a decision needed to be made that could not be adequately informed from data inside the firm. In Project 2, ZBA made a decision to enter a new market where they had no presence. A study of the market's attractiveness, focused on informing key aspects of the strategic decision, provided the data necessary to facilitate management's choice. In Project 3, the objective to create strategic partnerships led to the firm's procuring external market data from a strategic advisor that specifically provided information regarding market size and selected acquisition attractiveness. Although the search for information to inform critical decisions is not new, the inclusion of decision data as a component of a strategic performance measurement system is.

Simons (1995) notes that "based upon the unique strategic uncertainties they perceive, managers activate these systems for search purposes" (Simons, 1995, p, 96). This search will be an effort to obtain the information they need, but do not have, within their performance measurement system. Which means an essential element of a performance measurement framework in turbulent settings is performance data that exists outside the boundaries of the firm's traditional performance measurement domain. Managers routinely claim that they don't have the information they need to facilitate the major decisions they must make. When considered in the context of uncertainties, this is understandable. Performance information from within the firm is of limited use, so an effective performance measurement system for turbulent settings should reflect a composite of information that is needed—even if it is located outside the boundaries of the firm. Since managers need to routinely gather data for purposes of informing strategic

decisions, it should then be a key element of the strategic performance measurement model.

1.5.2.5. Performance Measures

Any performance measurement system necessarily requires a set of performance measures to be characterized as such. Beyond this basic premise, significant variations exist in what firms measure, why they measure, and how they measure—performance overall and especially strategic performance. From the standpoint of measurement, this study confirmed some existing strategic performance measure literature but contradicts other aspects of it.

This research found that performance measures were clustered in critical performance objective areas and in those areas, they presented in higher numbers than in other areas where performance was measured. In Project 2, several firms had a primary objective of revenue growth. For those firms, measures were highly concentrated in areas such as product sales at varying levels, bookings, order flow, and a number of other performance measures oriented on high-level growth objectives. Measures were also clustered, to a lesser degree, on expense management, headcount, and salary in particular. Following expenses, customer behavior was measured in detail, and the remainder of the measures was oriented on areas central to management or that reflected other, less critical performance areas. But as was the case with objectives, performance measures were not balanced, and there was no effort by managers to reflect a balanced view; this was true for every technology firm studied. The focus was on evaluating critical performance areas; in those areas there were a significant number of performance measures. This was also the case in Project 3 but with a slight modification. Measures in the health care system were clustered on critical performance areas—cost pressure and better value in particular—and there was a greater number of measures and detail in these areas. But in this case, the performance measures did reflect a balanced representation—they supported a multidimensional view of performance given that the firm was using the Balanced Scorecard. The conclusion is that the primary construction consideration when designing performance measures is identification of critical objectives. On those objectives—some of which are linked directly to uncertainty areas—measure concentration is high regardless of whether or not the performance measurement system is balanced. Balanced performance measure design is not a prerequisite or preclusion. This finding was consistent with Eisenhardt's (1989b) claim that in high-velocity environments,

managers place a premium on information from operations and the environment, but departed from Kaplan and Norton's (1992) view that strategic performance measurement systems must be balanced to be effective.

In a performance measurement system, measures are used for a variety of purposes. Performance measures can be used to comply with non-negotiable performance areas, check health, or challenge assumptions (Neely, 1998). Further, measures can be used differently, mainly diagnostically or interactively (Simons, 1995). What this research shows is measures present in turbulent environments are focused on critical objective areas and within those areas the measure number is higher than in other parts of the strategic performance measurement system.

1.5.2.6. Management Attention

The final element of the strategic performance measurement in the turbulent environments model is management attention. Management attention is perhaps the scarcest of all firm resources—a challenge that has hampered top management team effectiveness for decades (Simon, 1957). However, because of the influence management has on firm focus, it is a major consideration in the design and use of a strategic performance measurement system.

In Projects 2 and 3, management attention was the moderating variable in the models being explored. What was found was that top managers—the chief executive in particular—directed their team's attention to those elements of the strategic performance measurement system that they believed to be the most critical. In security software firms, where growth was often the focal point, top leaders designed performance measures, reporting structures, and review protocols around revenue growth. In instances where critical new products were being launched, the key executives were highly involved in the product development schedule. In another case, the top team wanted to look at "everything," so a war room was developed that presented measure information from virtually every aspect of the company's operations. In Project 3, the chief executive was concerned mostly with health care quality improvement leading to a high number of measures embedded in the strategic performance measurement system that were quality oriented and to the development of a quality dashboard. In every case, what guided the design and use of the system was the attention of top mangers.

In existing management control research, management attention is directed at different aspects of performance at different times. In Simons's (1995) Levers of Control framework, management's interest in uncertainties leads to their engaging in interactive control where they personally involve themselves in discussions regarding firm performance in uncertainty areas. This behavior was also found in this study—management attention drove use of the strategic performance measurement system. What is new in this study is that management attention is incorporated into the strategic performance measurement model as its own element because it is such a key determinant of how the model ultimately functions. Also, because management focus can change over time, it is recognized as a dynamic aspect of the model, which can, and should, be altered by top managers as necessary to better improve their monitoring of their firm and the environment.

1.5.2.7. Element Summary

As discussed in Sections 1.5.2.1 through 1.5.2.6, the key findings regarding each element are presented in Table 1-5 Element Findings Summary.

Table 1-5: Element Findings Summary

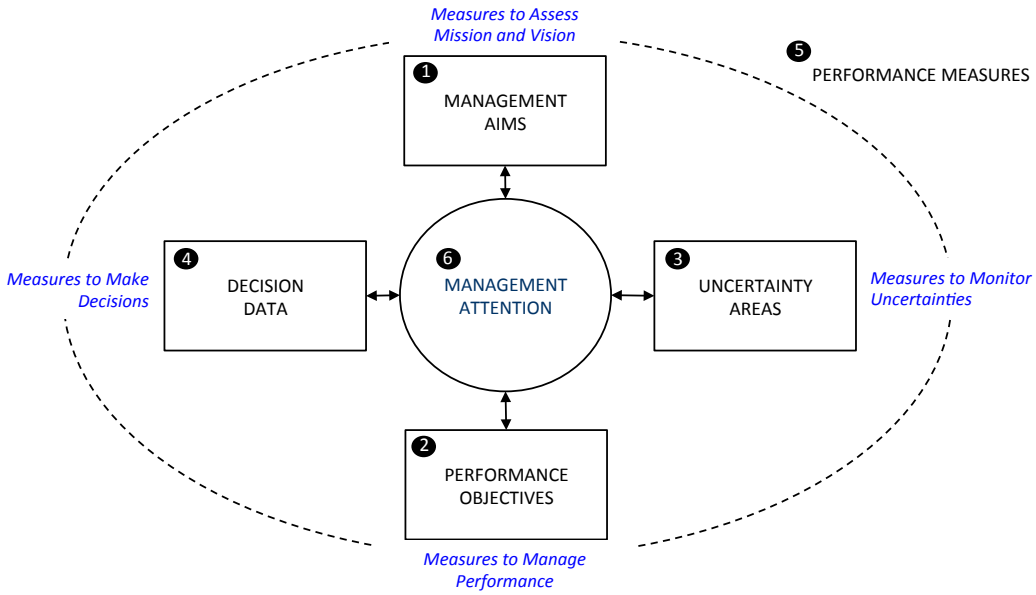
Element	Key Findings
Management Aims	Management aims, explicitly stated or not, will ultimately have the most significant impact on the development of the strategic performance measurement model.
Performance Objectives	Objectives are a critical element of the model. However, they need not be balanced or part of an explicitly articulated mental map to be effective.
Uncertainty Areas	Where objectives were aligned with uncertainty, measures provided insights. In cases where measures were not in place for the objectives, dialogue and focus on activities enhanced top managers' understanding of uncertainties. This combined focus of strategic objectives and measures on uncertainty areas coupled with interactive and diagnostic use of both simultaneously, is new to strategic performance measurement systems.
Decision Data	Performance information from within the firm is of limited use in decision-making so an effective performance measurement system for turbulent settings must reflect the information that is needed even if it is located outside the boundaries of the firm. Managers need to gather data for the express purpose of informing strategic decisions, and it is then a key element of a model of strategic performance measurement.
Performance Measures	In a performance measurement system, measures are used for a variety

	of purposes. What this research shows is measures present in turbulent environments are focused on critical objective areas and within those areas the measure number is higher than in other parts of the strategic performance measurement system.
Management Attention	What is new in this study is that management attention is incorporated into the strategic performance measurement model as its own element because it is such a key determinant of model functioning. Also, because management focus can change over time, it is recognized as a dynamic aspect of the model, which can, and should, be altered by top managers as necessary to better improve their ability to monitor their firm and the environment.

1.5.3. How does a strategic performance measurement system for a turbulent environment function?

The six elements discussed in Section 1.5.2 can be assembled into a graphical representation of strategic performance measurement in turbulent environments, as shown in Figure 1-6.

Figure 1-6: The Strategic Performance Measurement in Turbulent Environments Model



The model in Figure 1-6 reflects the assembly of the six elements discussed in Section 1.5.2 into a system that can be used by top managers to direct the development and use of a strategic performance measurement system in a turbulent

environment. The model shows how each of the elements works together in a dynamic way that enables top managers to direct their attention to those elements of the model shown in the research to be essential aspects of performance measurement in a turbulent environment. The model can be enacted in an organization at any point in time; it is not necessary to develop the model only when the top management team is formulating strategy. The research indicates that a series of subordinate questions can be used to facilitate model design. These questions are presented in sections 1.5.3.1 to 1.5.3.6 and summarized in 1.5.3.7.

1.5.3.1. Management Aims

The purpose of the management aims element is to articulate the primary aims the top team or top leader is trying to accomplish. Again, this element is essential because management aims were shown from the research to most strongly influence the design of the performance measurement system. Questions to guide the development and ongoing management of this element include: *What is the vision for the organization? What is the organization's mission? What is a succinct summary of the strategy? Where will the firm be positioned at the end of the short- and longer-term horizons?* The Management Aims element can be distilled into a concise set of statements or strategic objectives that can be measured and evaluated over time.

1.5.3.2. Performance Objectives

Every firm has a set of performance objectives—vital performance outcomes that must be achieved. These are often developed in conjunction with a strategy or reflect the most important performance areas identified by firm leaders. They may be part of a written strategic plan or they may not be. These objectives can be financial or non-financial in nature. They can reflect other performance measurement frameworks, like the Balanced Scorecard, but that isn't required. These objectives can be depicted in a in a cause and effect format or they may not be, depending upon the sophistication of the firm and the aims of top management. What is important is that the firm's required performance objectives associated with strategy be identified and organized in such a way that enables effective performance measurement. Questions to guide this element include: *What are the financial priorities of the firm? What are the new product or market goals? What must be accomplished vis-à-vis customer satisfaction or retention? What are the most pressing process improvement activities and what are they intended to deliver?*

What are the workforce development objectives? Are there any key stakeholder requirements that need to be met? These questions should help identify a set of strategic performance objectives that reflect the firm's highest priority aspirations.

1.5.3.3. Uncertainty Areas

The purpose of the uncertainty areas element is to identify what the top management team believes are the most critical uncertainties facing the firm. These uncertainties should be so significant that failure to monitor and manage them exposes the firm to severe consequences. By expressly identifying them—to the fullest extent possible—they then become more manageable. Questions to guide this element include: *What forces are driving the most significant change in the industry or in the business currently? What forces or threats serve as obstacles between achievement of management's aims and the firm's key performance objectives? What event or events have the highest likelihood of occurring coupled with the most severe impact if they occurred?* Although no risk assessment, internal or external, will ever prove completely accurate, the process of identifying and capturing uncertainty areas is vital in a dynamic and high-velocity environment.

1.5.3.4. Decision Data

Managers in turbulent settings are not able to assemble a comprehensive picture of performance at any point in time regardless of the sophistication of their performance measurement systems. The very nature of uncertainty precludes it. Therefore, they are constantly searching for data to illuminates those areas where they are operating without sufficient information. As such, an element of the model is decision data—often uniquely constructed in the form of in-depth studies or focused research projects—that informs strategic decisions. This element is included in the model because it presents as a routine occurrence among firms functioning in turbulent environments and is a source of critical information that—though not part of a traditional strategic performance measurement system—clearly plays a significant role guiding strategic decisions. Questions to guide this element include: *What are the major strategic decisions that facing the top team now? What data are critical to future performance that the firm needs but does not have? What do top leaders need to know that they do not currently know?* These questions can help identify the data needs of the top team while also shaping critical decisions.

1.5.3.5. Performance Measures

Performance measures underlie every element of the model. As shown in Figure 1-6, they provide the quantification that enables managers to determine if their aims—vision and mission in particular—are being achieved, if performance objectives are being met, if critical uncertainty areas are undergoing change, and if information regarding essential decision data is providing the insight needed to spawn action. Allocation of management time and attention to each of the outer four elements should also be measured. Because each of the other five elements—management aims, performance objectives, uncertainty areas, decision data and management attention—is comprised of performance measures, specific questions are not presented here to guide this element. Instead, a sample of types of performance measures used from one of the Project 2 case study companies is presented in Table 1-6.

Table 1-6: Examples of Performance Measures by Element in the Context of Turbulent Environments

Element	Performance Measure
Management Aims	Total Revenue (firm had a $1 Billion target set by CEO—all managers knew this)
Performance Objectives	Salary Expense (firm was required by corporate parent to keep below threshold % of revenues—tracked closely by Finance)
Uncertainty Areas	Biometric Security Development (firm monitored development of patent grants in this area—chief strategy officer monitored this)
Decision Data	Consumer Market Size (as part of new market entry decision, end user consumer market size needed to be determined—largest division general manager led the study)
Management Attention	Time Spent with Customers (firm monitored time the CEO spent with customers—CEO himself monitored this)

1.5.3.6. Management Attention

The management attention element is the intermediary between all other aspects of the model. It is top management's choices regarding how they allocate their attention that will determine the functioning and effectiveness of the model. The shape at the center is circular so that a distribution of time can be shown that approximates the amount of management time spent on each of the four outer

elements. Questions to guide this element include: *Given the level of turbulence or change in the industry, what is the distribution of time that should be spent monitoring and managing each of these elements? How much time do managers actually spend in each of these elements? Where is the greatest deficiency in terms of management attention? What change in management attention, if made immediately, would yield the most significant benefit in terms of performance?*

1.5.3.7. Element Summary

As discussed in Sections 1.5.3.1 through 1.5.3.6, the key findings regarding each element are presented in Table 1-7 Element Question Summary. The table was created to ensure that all aspects of the main research question and sub-questions are reviewed as a means to increase the overall construct validity of this research.

Table 1-7: Element Question Summary

Element	Key Question
Management Aims	• What is the vision for the organization? • What is the organization's mission? • What is a succinct summary of the strategy? • Where will the firm be positioned at the end of the short- and longer-term horizons?
Performance Objectives	• What are the financial priorities of the firm? • What are the new product or market goals? • What must be accomplished vis a vis customer satisfaction or retention? • What are the most pressing process improvement activities and what are they intended to deliver? • What are the workforce development objectives? Are there any key stakeholder requirements that need to be met?
Uncertainty Areas	• What forces are driving the most significant change in the industry or in the business currently? • What forces or threats serve as obstacles between achievement of management's aims and the firm's key performance objectives? • What event or events have the highest likelihood of occurring coupled with the most severe impact if they occurred?
Decision Data	• What are the major strategic decisions facing the top team now? • What data are critical to future performance that leaders need but do not have? • What do top leaders need to know that they do not currently

	know?
Performance Measures	• See questions in other elements
Management Attention	• Given the level of turbulence or change in the industry, what is the distribution of time that should be spent monitoring and managing each of these elements? • How much time do managers actually spend in each of these elements? • Where is the greatest deficiency in terms of management attention? • What change in management attention, if made immediately, would yield the most significant return in terms of performance?

The model presented in Figure 1-6 and the questions in Table 1-7 can be used in a number of different ways. First, the model can be used as a diagnostic tool by answering each of the questions posed in Table 1-7. The model should guide a top team toward an accurate assessment of the maturity level of each of the elements within the model. Second, the model can be used as an organizing structure to begin assembling data to be used in managing strategic performance. Managers are too often bound by existing routines that do not necessarily coincide with how performance ought to be managed; rather, they manage performance in accordance with how they have learned to do it. Third, it can be used as a mechanism to direct behavior, both diagnostically and interactively. The model enables the melding of existing performance measurement tools—like the Balanced Scorecard—with more theoretical frameworks, including Levers of Control. In so doing, it facilitates both diagnostic and interactive use within the same system. Finally, the model can be made highly dynamic and adaptable. Because it does not dictate the specific aims, objectives, performance measures, or uncertainties to be included, it allows managers to use it in a manner that flexibly accommodates their firm-specific needs.

1.5.4. Why should a strategic performance measurement system for turbulent environment be constructed this way?

The Strategic Performance Measurement in Turbulent Environments Model incorporates a several essential aspects of performance measurement that have not been before combined explicitly into a construct that enables managers to improve the way in which they guide strategic performance.

The first essential aspect is active management of uncertainty. Managers are aware that they face uncertainties in their organizations. In Project 2 uncertainty stemmed

from customer needs. In Project 3 uncertainty was caused in large part changing legislation and the demands associated with it. Regardless of the source, this model enables top managers to not only consider what their greatest areas of uncertainty are, but to organize them in a such way that facilitates routine monitoring and decision-making regarding their impact.

The second aspect of performance measurement expressly drawn into the model is the search for information to mitigate uncertainties. Managers search when they need information they do not have. Through uncertainty management coupled with a search for targeted decision data, managers have a performance measurement system that works actively and continuously to fill information voids.

The third aspect of performance measurement not expressly considered previously is the active direction of management attention to the various elements within the model itself. Strategy implementation in turbulent environments is challenging because of many factors. This model will help managers direct their attention toward a set of elements that represent the most critical areas they need to be focused on to succeed in that environment.

The final aspect of performance measurement embedded in the model is dynamism. The model itself is dynamic in that managers choose what to pay attention to contingent upon those element that are most in need of their attention. Top managers' aims, performance obligations, decision needs and sources of uncertainty are all areas which need to be routinely monitored—and are areas that can be updated at any time. This model helps managers maintain the right tension and focus all at once.

1.5.5. What factors limit the generalizability of this strategic performance measurement system for a turbulent environment?

As general as the model is, it is not intended to function in all environments. Thus, the limitations of the model need to be addressed.

First, the model applies to turbulent settings—settings characterized by sustained change among a number of variables that are difficult to interpret and monitor successfully. This is why the model includes an element that reflects uncertainty explicitly. It is also why the model draws from information processing theory so

heavily. When applied in a stable setting, uncertainty would be limited, if existent at all, and there would ultimately be little need for an interactive element in this arena.

Second, the model is designed for use by senior leaders—the top management team in particular. These executives are charged with designing the firm's business strategy, identifying performance objectives, and managing the firm's activities in such a way that objectives are achieved. While the model may have communication value to lower-level employees, it will not prove particularly fruitful in helping them manage performance at a more granular level.

Third, the model is not intended to manage all aspects of firm performance. It was created within the narrow domain of strategic performance. Although strategic performance measurement and management are critical to a firm's effective functioning, these represent only one facet of a firm's overall performance measurement infrastructure; viewed comprehensively, that infrastructure would include, for example, systems that measure operations, financial management systems, and human resources systems.

1.5.6. Summary

This research draws from concepts related to management control, cybernetics, information processing and managerial attention and combines them into a model of strategic performance measurement in turbulent environments. Based upon the findings from firms in two turbulent industries, the model incorporates the main external contextual factor of uncertainty with the primary internal factor of management aims into a framework that gives managers a dynamic construct with which they can manage performance. Through ongoing monitoring of the environment coupled with active search for decision data, managers can take steps to close the gap between information they need and information they have thereby reducing uncertainty and improving their ability to manage performance in the areas in which they need to produce results.

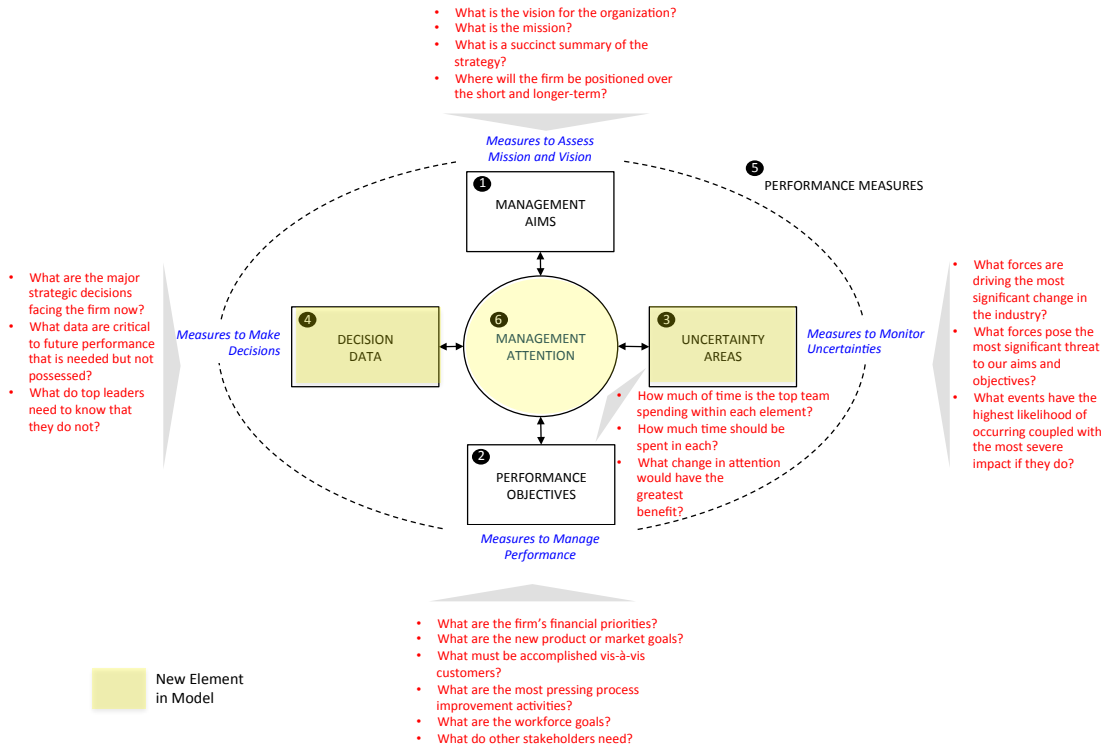
This research supports several expectations that existed at the start of the study, did not support others while providing notable surprises as well. In terms of confirmation, the expectation that environmental and organizational variables as well as management attention would influence the strategic performance measurement model was confirmed. The findings from the systematic literature review conducted in Project 1—presented in section 1.2.5.1 of this Linking

Document—suggested this would be the case and that was confirmed in both Projects 1 and 2. Also, the view that a strategic performance measurement system can play a variety of roles contingent upon its design was found to be the case in both Projects 1 and 2. The direct link to decision-making was not observed. While literature indicates that strategic performance measurement systems support decision-making, there was no clear evidence that it did so in a direct way. It played more of a progress and position-tracking role than one oriented on providing direct decision information. Technology played less of a role in driving change than expected. The literature indicates technology is very much a critical driver of environmental turbulence; in the case firms other variables such as customer demands in Project 2 and the demand for improved value in Project 3 played a more significant role in industry change. A surprise, and contradiction to previous literature—was the finding that strategic performance measurement systems need not be balanced to be effective; this was found in Project 2 where all of the seven firms examined had unbalanced systems. While Project 3 did find a balanced strategic performance measurement system in place, it can't be claimed—based on this research—that it is a necessary element of the model. Lastly, a unique finding was that different parts of a strategic performance measurement system can be used for different purposes. In Project 3, the top-team used their Balanced Scorecard measures diagnostically, however, they used their strategic objectives interactively, thereby enabling the same strategic performance measurement framework to be used both diagnostically and interactively at once.

1.6. Conclusions

This research contributes to existing research and practice in number of ways. In the area of research, it provides a contribution to literature in the area of turbulent environments as well as extending application of information processing and management attention within a performance measurement framework. In the area of practice, this research could help top managers integrate existing strategic performance measurement frameworks into a comprehensive model that facilitates both diagnostic and interactive use. These contributions are explained in the rest of this section. Further, it offers a dynamic approach to strategic performance measurement within turbulent settings by placing at the center of the model management attention—an element that can be shifted by managers toward the external elements contingent upon their information needs at any point in time. Figure 1-7 shows the final model, which highlights key contributions that are new elements to strategic performance measurement systems.

Figure 1-7: Research Results: The Strategic Performance Measurement in Turbulent Environments Model



1.6.1. Contribution to Research

This research makes contributions in the area strategic performance measurement in turbulent environments as well as in the area of integration of existing theoretical views on cybernetics and information processing with strategic performance measurement. These will be explained in the following subsections.

1.6.1.1. Turbulent Environments

There are very few studies of strategic performance measurement pertaining to turbulent environments (Hoque, 2004; Bisbe and Malagueno, 2012). Researchers have been asking that studies be conducted which shed light on how performance measurement systems can be designed to accommodate changes in business priorities (Bititci et al., 2000) as well as promote greater flexibility and dynamism (Franco-Santos et al., 2012). This research closes part of this gap, particularly on

how dynamism can be embedded into the strategic performance measurement system itself (Kolehmainen, 2010) and how organizational paralysis and inertia caused by the system can be overcome (Micheli and Manzoni, 2010) in the turbulent environment context.

The figure shown in Figure 1-7 depicts an element of the model focused on uncertainty areas. As this research indicates from both the security software and health care industries, uncertainty is a major aspect of attention and a key driver of performance in turbulent settings. Drawing on the concept of semi-structures (Brown and Eisenhardt, 1997) as well as performance measures oriented on uncertainty (Simons, 1995), managers monitor developments rising from uncertainty areas so as to better equip their firms to navigate turbulent environments. While uncertainty and turbulence is recognized as a challenge to strategy and performance (Eisenhardt and Sull, 2001; Sull and Eisenhardt, 2012), it has not until now been incorporated formally in a strategic performance measurement framework itself. Scholars have established the relationship between the external environment, firm fit, and performance (Wernerfelt, 1984; Teece et al, 1997). It is recognized too that in order to maintain performance, firms must adjust their fit to the environment as it changes and that "practitioners should recognize the importance of industrial and environmental factors" (Lo, 2013, p. 217). While studies have been conducted to aid in understanding how non-financial performance measures moderate the relationship between uncertainty and performance, findings have not shown a positive relationship (Hoque, 2012). **This study finds that the relationship between the firm and its environment is achieved through use of multiple mechanisms which include performance measures, strategic objectives, decision studies, and semi-structures all of which enable top managers to focus their attention on critical uncertainties thereby gathering the information needed to maintain the fit between the firm and its environment. This focus on uncertainty coupled with the integrated use of multiple mechanism embedded into the structure of the strategic performance measurement system was not known before this research and is a specific result of it.**

1.6.1.2. Theoretical Integration

The model in Figure 1-7 accommodates managers' need to search out additional information in their effort to counteract uncertainties caused by environmental turbulence. Further, the model acknowledges the view that mangers have limited

attention and must make trade-offs regarding how to best focus their strategic performance efforts.

As discussed in section 1.5.1.3, as turbulence levels grow and uncertainty increases, managers will increase their efforts to locate information that is not possessed by the organization for purposes of improving its decision-making capacity (Galbraith, 1973). The study found that managers rely upon their strategic performance measurement system to provide information pertaining to how well they are meeting existing performance objectives, but they expressly seek external information on occasions where they are making strategic decisions. Managers also establish semi-structures (Brown and Eisenhardt, 1997) within their strategic performance measurement systems as means interact with areas that are causing uncertainty and turbulence. Existing strategic performance measurement literature indicates much of strategic performance measurement is based upon closed loop feedback systems (Kaplan and Norton, 2000b) and forms of diagnostic control (Simons 1995). With the addition of the uncertainty areas and the decision data element, managers have a mechanism to incorporate feedfoward control in addition to feedback control within the same model. **Thus, this research confirms existing theory which claims that both diagnostic and interactive control are aspects of a strategic performance measurement system and that a single framework like the Balanced Scorecard can be used as a means to guide both diagnostic and interactive control (Tuomela, 2005). It also refines and extends theory in the area of management. While Simons's Levers of Control (1995) framework incorporates uncertainties, he notes that uncertainties are monitored through existing performance measurement and management structures. This research found that performance measures which were part of an existing strategic performance measurement system did inform managers regarding critical uncertainties; managers, however, also received valuable information from semi-structures embedded into the strategic performance measurement system (Brown and Eisenhardt, 1997). Further, the use of these semi-structures such as strategic alliances and integrated sales/engineering teams enable firms to effectively probe into and monitor uncertainty areas as a component of the strategic performance measurement system. Finally, within the single model, both feedforward and feedback control can be facilitated. This extension of the management control theory and cybernetics through integration with the concept of semi-structures was not known before this research and is another specific result of it.**

1.6.2. Contribution to Practice

This study makes valuable contributions to practice by providing a means for top teams to integrate several aspects of strategic performance measurement into one system as well as providing a model that will help managers dynamically manage their strategic performance measurement focus and effort.

1.6.2.1. Strategic Performance Measurement Integration

Despite the lack of agreement among scholars regarding the effects strategic performance measurement has on practice, there has been no shortage in the number of strategic management tools and frameworks that have been provided to managers over the past 20 years to aid them in their efforts to deliver improved strategic performance. From the Performance Management Questionnaire (Dixon et al., 1990) to the Performance Prism (Neely et al., 2002), a number of effective performance measurement frameworks exist that have an impact on practice. This research shows that even when approaches conflict—for instance whether or not to have balanced objectives—there are common elements that are enduring features of an overarching strategic performance measurement framework. Section 1.5.1 highlights the elements of the model which include high level management aims to be reached, a set of strategic performance objectives to be delivered, identification of uncertainties which are likely driving change, data to be gathered and organized in such as way that it facilitates strategic decisions and set of performance measures that can be used in each of the other elements all of which together help direct management attention. **This research shown in Figure 1-7, presents a strategic performance measurement system in a turbulent setting that: accommodates existing performance measurement frameworks; presents strategic objectives as an element of the system indicating that they should be aligned with critical aims and uncertainty areas; shows decision-specific data as a discrete aspect of the framework; highlights how management attention as a central element system effectiveness. This was not known before this research and, as a result of it, is available to practitioners.**

1.6.2.2. A Dynamic Means to Measuring Turbulence

Calls by researchers for more dynamic strategic performance measurement systems are joined by practitioners' demands for tools and techniques that are flexible and adaptable to their operating environments. Despite the many advancements and

ongoing adoption of tools highlighted in section 1.6.3, managers continue to feel constricted by the prevalence of diagnostically oriented strategic performance measurement approaches that largely financially oriented. While constituting significant advancements over the basic budget—the dominant performance measurement tool in practice today—many frameworks in use do not address the turbulent nature of industries and the dynamic requirements of management. **This research provides top managers with a strategic performance measurement framework that integrates the various elements of strategic performance found from the studies to be aspects of effective strategic performance measurement. Supporting the framework is a set of questions that provide managers with direction in designing their strategic performance measurement system as well as focuses their attention contingent upon the appropriate amount of effort needed to be spent in each element. This was not known before this research and again, as a result of it, is available to practitioners.**

1.6.2.3. Answering the Research Question

Detailed answers to the subordinate research questions regarding how firms in turbulent environments measure strategic performance can be seen in Table 1-3: Thesis Meta-Analysis. This section provides a summarized answer to the research question posed at the outset of the Linking Document.

Managers of firms operating in turbulent environments establish a set of high-level aims that provide overall direction to their organizations. In concert with these aims, they develop specific performance objectives that need to be achieved. These provide more specific guidance to the organization. These objectives are often aligned with areas of strategic uncertainty that reflect focuses for top managers. To inform these uncertainties, managers often collect decision specific data to close the information gap caused by uncertainties or they establish semi-structures to help stay within close proximity of the sources of uncertainty when effective measures cannot be established. They use performance measures, often times in depth, to capture information and provide insight in each of the elements to the fullest extent possible—management aims, performance objectives, uncertainty areas and decision-data. Contingent upon their chosen attention level toward each of these elements, top managers focus their attention on those aspects of the strategic performance measurement that they believe are most vital to their success.

1.7. Validity of the Study

While case studies have grown for use in mainstream research, they are still challenged by many researchers in terms of their methodological rigor. As Eisenhardt and Graebner note, "when using theory building from cases as a research strategy, researchers also must take the added step of justifying why the research question is better addressed by theory-building versus theory-testing research" (Eisenhardt and Graebner, 2009, p. 26). Incumbent upon case-based researchers is ensuring their research meets this test as well as the general standard of being good quality scientific research. Meeting these standards is accomplished by addressing four standard tests before, during, and upon completion of the research (Yin, 2003). These are discussed in the sections 1.7.1 through 1.7.4.

1.7.1. Construct Validity

Construct validity pertains to the research design ensuring that it fully addresses the research questions and research objectives. This research accomplished this by using multiple sources of evidence from both field studies. In Project 2, semi-structured interviews were conducted within seven different firms. Published data as well as internal data was reviewed. In Project 3, semi-structured interviews were used as was questionnaire data coupled with internal archival data and direct participant observation. Case study protocols were used, as was an interview guide in both projects; these were updated and improved after the conduct of pilot tests. The data collected was reduced to make it more manageable and decomposed further around the specific research questions in both studies. Coding was employed in both projects after data reduction during the analysis process.

1.7.2. Internal Validity

Internal validity assesses the extent to which causal relationships can be established in the study. To facilitate this, data was collected using multiple methods in both projects: semi structured interviews—13 in Project 1 and 17 in Project 2; archival data including internal company reports and meeting information, direct participant observation along with external published information. A logic model with roots in the systematic literature review was developed in Project 1 and served as structure to conduct the inquiry in Project 2. Upon completion of Project 2, the model was refined and a series of supporting propositions were developed that served as data collection architecture in Project 3. Operational definitions and constructs were

built prior to model assessment through data in Project 3. After collection, Project 2 data was reduced and company cases were constructed organized by research question. Within and cross-case analysis was done using multiple data displays to develop explanations and begin theory construction. Variances in data were explored for purposes of improving the emerging theory. In Project 3, multiple data sources enabled triangulation with the research model for purposes of further refinement.

1.7.3. External Validity

External validity focuses on the generalizability of the research. To ensure external validity, Project 2 explores data from seven different firms in the security software industry. As discussed in section 1.7.2, the findings from the study were assembled into cases that facilitate data analysis. The research propositions and a research model that was developed was carried into and replicated in Project 3 in one in-depth case study from within the health care industry. Carrying out research in two different environments with multiple firms serves to strengthen the analytical generalizability of the research model. Because the research was carried out in turbulent settings, it will not be generalizable to more stable environments. Additional limitations are discussed in section 1.8.

1.7.4. Reliability

Reliability is concerned with the replicability of the study. To develop reliability, in both projects a case study protocol and an interview protocol were used with informants. A sample interview protocol is presented in section 6.4. In Project 2, interview data was summarized and assembled along with archival data, into firm specific analytical cases. The seven analytical cases, organized around key research questions, provide the means to analyze within and across firms. An example is provided in section 6.5. The propositions and model deduced in Project 2 are examined in Project 3 using clear constructs and research questions build up from published literature. Findings generated from the case were evaluated for validity with members of the supervisory panel during periodic assessments. Recommended refinements to the analysis were incorporated in all instances.

1.8. Limitations of the Study

While this research makes important contributions to both existing theory and practice, the findings contained herein must be considered along with the study's limitations.

1.8.1. Research Site Limitations

The research was carried out inside two separate setting that were considered to be appropriately turbulent for purposes of the study. However, it cannot be claimed that these settings are reflective of all turbulent settings. Turbulence is a multidimensional construct and the causes of turbulence in one setting may not be reflective of sources of turbulence in another setting. This model would be benefitted by further exploration and refinement in other, ideally more dynamic, settings.

1.8.2. Method Limitations

The research employed case studies to explore how firms in turbulent environments measure strategic performance. Case studies provide rich descriptions of settings and enable researchers to generate novel insights regarding environments and their actors (Yin, 2003). But despite alignment of the research methods and epistemology, case research within a selected number of firms cannot be expected to unearth all possible mechanisms that represent the functioning of organizations in their environments. Other methods, more quantitative approaches in particular, should be used to test the findings further in these as well as other industry settings.

1.8.3. Informant Selection

Thirty interviews were conducted with top mangers—chief financial officers in particular—across eight organizations in both studies. While this is a substantial selection generating hundreds of pages of transcripts, it is unlikely the views of the interviewees accurately reflect the perspectives of top managers working in the vast number of turbulent industries. Further, because the informants in Project 2 restricted access to other members of the executive team, it cannot be assured that their individual responses accurately portrayed the functioning of the top team or the strategic performance measurement systems from within their firms.

1.8.4. Researcher Bias

As hard as any researcher works to remove bias from their research efforts, it has a possibility of seeping into the study. The researcher in this study hails from the field of performance measurement and management and has had professional affiliations with several of the scholars referenced herein. It is possible that biases with the published researchers and their frameworks were not fully eliminated from the analysis and study findings.

1.8.5. Generalizability Outside of Turbulent Settings

The model shown in Figure 1-7 was developed from and for use in turbulent settings. It is not intended—nor should if function effectively—in environments that are not turbulent. In industries that are not undergoing significant change there would be few, if any, sources of turbulence. Management attention would not need to be directed toward uncertainties because there would likely be few of them stemming from the environment. Further, there would be limited need for decision data from outside the strategic performance measurement system as the system itself would contain sufficient measurement information to enable effective strategic decisions.

1.8.6. Theoretical Limitations

The purpose of this study was exploratory—to understand how firms in turbulent settings measure strategic performance for purposes of designing a theoretical model that not only contributes to the strategic performance measurement research discussion but also the practice of strategy management by operating manager. In this regard, the study met its purposes. However, it the output of the study is an early stage theory that by definition is an incomplete representation of the constructs and mechanisms reflecting strategic performance measurement in two separate settings. It should be evaluated with this limitation in mind.

1.9. Future Research

There are a number of areas that merit further research and investigation. This section provides insights into those that align with the findings contained in this study.

1.9.1. Adaptation of Strategic Performance Measurement Systems

As business conditions and businesses themselves change, so too will the strategic performance measurement systems that enable top leaders to manage strategic

performance. Scholars have conducted previous work in this area (Kennerley and Neely, 2002; Kennerley and Neely, 2003; Bititci et al., 2000) however knowledge of strategic performance measurement system dynamism and adaptation is still emerging (Micheli and Manzoni, 2010). As a growing number of industries grow more turbulent, researchers would be well advised to explore what aspects of strategic performance measurement systems evolve, how firms manage the evolution and what benefits managers receive from the resultant strategic performance measurement system.

1.9.2. Integration of Interactive and Diagnostic Control

Simons's Levers of Control framework (1995) has had a significant impact on the way researchers explore management control and performance measurement. Recent studies, in addition to this one, show how performance measures can at once be used diagnostically and interactively (Tuomela, 2005). Other literature has been published that offers refinements to the framework for purposes of adding specificity (Tessier and Otley, 2012). Given the importance of enacting interactive and diagnostic control simultaneously, future research could explore how managers gain economy and focus in their performance measurement efforts in accomplishing both.

1.9.3. Measurement of Uncertainty

As discussed in section 1.2.3 the environment within which organizations operate today are becoming increasingly volatile (Comin and Mulani, 2006). Turbulent conditions are becoming the norm rather than the exception. Recent literature has been published that presents more precise conceptualizations of constructs such as velocity (McCarthy et al., 2010) yet which aspects of turbulence specific affect performance measurement system and how it does, is not well known. Understanding the sources and effects of turbulence on strategic performance measurement systems and practices will be essential if the field is to professionalize further.

2. Project 1: Systematic Literature Review

2.1. Abstract

2.1.1. Purpose:

Through a critical examination of literature on strategy, performance measurement and management and turbulent environments, this review asks and answers the following five questions:

1. What challenges do managers face measuring and managing strategic performance in turbulent environments?
2. How do firms in turbulent environments measure and manage strategic performance currently?
3. For those firms within turbulent environments that employ strategic performance measurement and management systems, what elements are contained therein?
4. What factors affect the design of strategic performance measurement systems and management in turbulent environments?
5. How can firms improve strategic performance measurement and management in turbulent environments?

2.1.2. Design/Methodology/Approach:

The review follows a systematic literature review approach that provides a structured, evidence-based means to explore, select and analyze management literature for purposes of enhancing knowledge regarding what has previously been written within the three literature domains that form the foundation of the study (Tranfield, et al., 2003)

2.1.3. Findings:

The findings from examination of literature indicate the following: considerable research has been conducted in the areas of strategy and turbulence which draw heavily on the earliest research in the field; performance measurement and management literature, while growing rapidly, is still fragmented and largely empirically based; and collectively there is an absence of either theory and research regarding the functioning of performance measurement systems in turbulent environments.

2.1.4. Research Implications:

This research aggregates and analyzes literature from three different academic fields that have little current integration. The study aids in the development of theory by not only identifying gaps but also through the proposal of a preliminary model of strategic performance measurement in turbulent environments that comprises environmental, organizational, technological and managerial variables. This model is intended to serve as a starting point for future empirical investigations.

2.1.5. Managerial Implications:

The research provides guidance to top managers operating in turbulent environments by helping them understand and dimensionalize the concept of turbulence, gain an understanding of the impact uncertainty has on their firms and orient them toward the types of information that they will need to focus their attention toward in order to operate successfully in turbulent settings.

2.2. Introduction

2.2.1. Research Problem

In today's global economy, where the technology lifecycle is shortening and information availability is growing, organizations are experiencing change to such a degree that they scarcely have the capacity to respond (Hamel and Vailikangas, 2003). Historically, firms could expect to exist in stable environments punctuated by short-lived, but somewhat dramatic, periods of change (Tushman and Anderson, 1986; Romanelli and Tushman, 1994). Today, they must learn to cope with the very opposite—continuous change interrupted by fleeting periods of stability (D'Aveni and Gunther, 1995; Brown and Eisenhardt, 1997). This change in context is causing organizations to question their most basic operating assumptions:

- Will we have the needed human resources, and will they have the necessary skills to compete effectively?
- Will the products and services we provide have a sufficient useful life to enable us to recover our investment?
- Are laws and regulations likely to change in a way that may permanently impair our business model?
- Is there a development that might occur within or adjacent to our industry that could dramatically change the nature or economics of competition?

In turbulent environments, the answers to these questions are not readily apparent, but one aspect is certain: the ability of a firm to successfully compete in this setting will be determined by their ability to detect signals from the environment, interpret them accurately, and respond in ways that enable appropriate adaptation to shifting conditions.

One of the most fundamental ways an organization monitors its interaction with its environment is through its performance measurement system (Neely, et al. 1995; Kennerley and Neely, 2003). This managerially constructed system of data identification, collection, and communication helps firms sense what is occurring in the internal and external environments and respond appropriately. It follows then that an organization's ability to effectively respond must be in some ways linked to the efficacy of its performance measurement system.

It is at this point—the intersection of the performance measurement system and the firm's environment—where the research question emerges. Turbulent environments can produce significant change in short periods of time—as little as six months (Fine, 1998). Some industries—such as online gaming—undergo dramatic change in even shorter periods. Traditional performance measurement systems, which are generally based on closed-loop processes and intended strategies, are not equipped to support the information needs of firms that must adapt constantly within a turbulent setting. Some anecdotal evidence seems to support this assertion. A review of 84 organizations in the Balanced Scorecard Hall of Fame—Balanced Scorecard using organizations recognized by the concept creators for their performance results—found that only four came from the technology industry.[1] Most came from what could be characterized as slow clockspeed industries, such as heavy manufacturing, financial services, and the public sector.

Nevertheless, technology companies and other firms in high velocity environments must manage their performance—with or without a Balanced Scorecard or some other formally defined strategic performance measurement framework. This study aims to understand how they accomplish this by investigating how selected factors from the environment and the organization itself combine to influence the design and use of the strategic performance measurement system. Despite what is known about performance measurement frameworks and systems today, much less known is how organizations actually establish these systems or modify their performance management practices in changing environments (Neely, 2005). Scholars admit there is research to be done updating the frameworks that have been relied on for years (Nixon and Burns, 2005).

In this study, the research problem is concerned with how organizations in turbulent industries, measure and to a lesser degree manage, the strategic aspect of performance. The systematic review of literature informs this question and serves as the first step toward making a meaningful contribution to management knowledge.

2.2.2. Positioning the Research

To address the primary research question, the systematic literature review carefully evaluates three themes of literature: strategy, performance measurement and management, and turbulent environments.

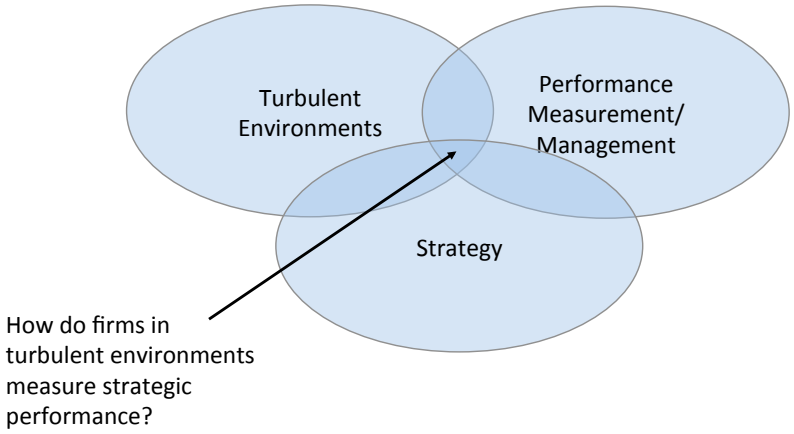
[1] Source information obtained from internal Balanced Scorecard Collaborative/Palladium documents.

The strategy theme is explored in order to understand how strategy develops over time and how it is controlled during implementation in particular. The literature review pays particular attention to strategy making and implementation in environments that are considered to be volatile or turbulent in nature. The performance measurement and management literature is examined to understand the characteristics of effective performance measurement and management systems, specifically, design attributes, usage patterns, and update activities. Like the review of strategy literature, the review of performance measurement literature focuses on what can be termed strategic performance measurement and management systems. Strategic performance measurement systems—a subset of an overall performance measurement system—enable a firm to determine how well the elements of its strategy are being implemented and whether or not the strategy being implemented is having the intended effect. It also helps in some instanced gauge emerging strategy. Perhaps the least-defined theme of the study, turbulent environments, inventories organizational theories and environmental constructs that explain the nature of volatile environments, their impact on firms, and how firms themselves can best be structured in order to cope with the conditions that turbulent environments produce.

2.2.3. Literature Mapping

The three themes of literature intersect into one perspective that culminates at the point of the research question, as shown in Figure 2-1.

Figure 2-1: Literature Map



2.3. Definitions

This section defines key terms used throughout the study to ensure that they are properly understood within their context of use.

2.3.1. Strategic Performance Measurement and Management

The fundamental building block of a comprehensive system to manage performance is an individual performance measure. An individual performance measure constitutes a means or metric for quantifying the efficiency and effectiveness of an action (Neely et al., 1995; Neely, et al., 1997). Within a firm, the universe of performance measures can be aggregated into groups that provide the information essential to monitoring various aspects of firm performance. These sets of performance measures are often organized into performance measurement frameworks which typically help clarify boundaries, identify measure dimensions and demonstrate relationships between individual performance measures (Folan and Browne, 2005). Selected frameworks, whether used individually or in association with other measures or sets of measures, comprise a performance measurement system, which is a set of metrics used to quantify the efficiency and effectiveness of actions (Neely et al., 1995). When managers engaged in the process of collecting measurement information as it relates to the performance measures they have established, they perform the process of performance measurement (Neely et al., 1995). The process of performance measurement, analysis and use of performance measurement systems in conjunction with an organization's formal and information

structures, culture and resource practices constitutes an overall system of performance management (Anthony and Govindarajan, 2001).

The phrase used today to describe the full range of performance management activities within an organization is corporate performance management. The term has been defined as "an umbrella term that describes the methodologies, metrics, processes and systems used to monitor and manage an enterprise's business performance." (Gartner, 2006). Corporate performance management systems incorporate multiple dimensions of organizational activity, including strategy, finance, operations, human capital, and information technology (Kaplan and Norton, 2006).

This study is concerned with the portion of the performance management system that relates to the implementation and control of a firm's strategy. This will be termed a strategic performance measurement system. Consistent with the three-step model of strategic control provided by Schreyogg and Steinmann (1987), a strategic performance management system should comprise not only the measures, but also the frameworks, information flows, analytical activities, and decision-making routines within a organization that facilitate the control of strategy implementation activities, control of premises underlying the strategy, and surveillance of the environment—both inside and external to the firm—to understand the events that may imperil the intended course of action.

2.3.2. Turbulent Environments

Organizations operate within broader environments that represent the complex interactions of a variety of forces, including competitors, suppliers, regulators, economic factors, and technology advancements. Environments of particular interest are those undergoing the most persistent, unpredictable change in the shortest periods of time.

To understand the nature of environmental change, the underlying variables causing change need to be isolated and examined. Emery and Trist, in their 1965 paper "The Causal Texture of Organizational Environments," identify two separate variables—complexity and dynamism (Emery and Trist, 1965). Environments can also be characterized in terms of organizational task (Starbuck, 1976). A common set of dimensions relative to the task environment are munificence *(*environmental capacity), dynamism (stability/instability), and complexity

(homogeneity/heterogeneity, concentration/dispersion) (Dess and Beard, 1984). Notwithstanding munificence, dynamism and complexity can be combined into a gauge of turbulence where turbulence is a function of the number of competitive configurations combined with levels of relative stability/instability. An environment that exhibits significant turbulence has a large number of complex, competitive configurations combined with high degree of dynamism. This definition is consistent with "high velocity" environments as defined by Eisenhardt and Bourgeois (1988), in which the aggregate level of environmental change is both rapid and discontinuous and is driven by changes in demand, competitors, technology or regulation.

2.4. Theoretical Perspective

This study seeks to explain the conditions and setting in which some elements of a strategic performance measurement system would be emphasized or employed more than others. This is expected to be contextually and organizationally dependent. The theory that would best support this research would assist then in explaining the differences apparent in one context versus another. Contingency and Information Processing theories seem well suited explain this phenomenon at the aggregate level.

2.4.1. Contingency Theory

Contingency theory states that there is no one best way to organize and that any one way of organizing is not equally effective under all conditions (Lawrence and Lorsch, 1967). Any system or organization itself must adapt to its environment in order to survive over time. The overall aim of this study is to understand how strategic performance measurement systems function in turbulent environments and what variables most significantly impact the design and use of those systems.

Contingency theory has been applied previously in management accounting, management control, and strategy—the parent disciplines of performance measurement—with mixed results (Hayes, 1977; Otley, 1980; Emmanuel et al., 1990). More recently it has been applied to performance measurement (Rejc, 2004). However, contingency theory employed properly should aid in identifying the contingent variables that should be considered by managers when developing their own strategic performance measurement system. Shortcomings in previous research based on contingency theory has been attributed in part to a lack of clarity with respect to the models used (Hayes, 1977; Waterhouse and Tiessen, 1978).

Identifying an appropriate conceptual framework should mitigate this risk in this and subsequent studies.

2.4.2. Information Processing Theory

Information Process theory posits that the greater the uncertainty of a task, the greater the amount of information that must be processed between managers during execution of that task (Galbraith, 1973). Further, uncertainty is defined by Galbraith as "the difference between the amount of information required to perform a task and the amount of information already possessed by the organization (1973, p. 5).

Because performance measurement incorporates capturing, aggregating, analyzing and disseminating information among managers, Information Processing theory is commonly applied in studies of performance measurement and management systems (Henri, 2006; Widener, 2007). In turbulent settings where the need for information is at a premium, Information Processing theory should provide a beneficial construct from which to examine strategic performance measurement elements and activities as well as information flows.

2.5. Potential Contribution to Knowledge

Strategy implementation is an important issue facing executives (Conference Board, 2005). The output from the overall thesis, of which this systematic review is a component, is intended to be a strategic performance measurement framework for use by managers in designing and implementing performance measurement systems in turbulent settings. Top managers operating in turbulent settings ought to be able to understand and evaluate the variables that impact strategic performance measurement and then design a strategic performance measurement system that then improves their ability to control strategy and thus organizational performance.

This potential contribution to knowledge then is situated at the convergence of strategy, performance measurement, and turbulent environments literature. Strategy constitutes the set of activities—either intended or emergent—a firm pursues to improve or sustain its rent making capabilities. Performance measurement is the field that incorporates management control and management accounting in a holistic mechanism of enterprise performance evaluation. Turbulent environments are the conditions and contexts of volatility in which a firm operates.

2.6. Themes of Literature

The study critically examines the intersection of three distinct themes of literature: strategy, performance measurement and management as well as turbulent environments. An initial scoping of the literature is now discussed.

2.6.1. Strategy

Literature related to strategy has evolved significantly as this management field has formalized. Business strategy literature traces its roots to the writings of military leaders, such as Sun Tzu in China in the sixth century BC and Karl von Clausewitz in nineteenth-century Europe. Modern business strategy literature emerged in the twentieth century with the publication of *Theory of Games and Economic Behavior* (Von Neumann and Morgenstern, 1944), a book that explains how mathematics can depict competitive interactions among different actors.

The study of business strategy, as it is known today, focused first on long-range or strategic planning, starting in an exploratory manner after World War II (Ewing, 1956; Quinn, 1961). Strategic planning began formalizing with the appearance of process-based literature, which persisted for about two decades (Steiner, 1967; Vancil and Lorange, 1975; Lorange and Vancil, 1976; Steiner, 1979). Planning research waned during the 1970s as a more comprehensive, policy-oriented approach to strategy arose (Christensen, et al., 1978; Bower, 1982).

Policy research eventually gave rise to the analytically based techniques adapted from the field of industrial organization (Bain, 1956). Economics until that point was concerned with the industry as a unit of analysis. Porter (1979) began examining conditions inside industries to better understand the causes for variances in individual firm performances. Blending this approach with business policy research, he demonstrated that firms were active agents within their industries and that the study of strategy could actually be carried out using analytical methods (Porter, 1980; Porter, 1985).

Throughout the 1980s, scholars challenged the belief that strategy was a largely analytically driven or planning-based endeavor. Emergent or incremental strategy posits that strategy develops over time as organizations discover, sequentially but non-linearly, patterns of actions that improve environmental fit while increasing slack generation abilities. The unplanned or emergent school established their

alternative views as a viable means of strategy formation with in-depth studies of organizations that showed examples of emergent strategy making (Pascale, 1984; Mintzberg and McHugh, 1985; Mintzberg and Waters, 1985).

Researchers searching for sources of formed strategies asserted that strategy was a function of an individual firm's combination of resources and capabilities. This resource-based approach to strategy making was not new—it was originally identified in early business history writing (Penrose, 1959). In the resource-based view of the firm, the firm is the collection and organization of valuable resources that, when configured in a way that is unique, provide a means to achieve competitive advantage (Wernerfelt, 1984; Hamel and Prahalad, 1990; Barney, 1991; Grant, 1996). To the extent that those resources are largely inimitable or free from material substitution by alternative sources, they can provide a competitive advantage that is sustainable in nature (Barney, 1991).

Although discussed as far back in the literature as strategic planning itself, strategy implementation and control received little formal treatment until the 1980s. It was then that scholars began researching the impact organization structure, measurement, and decision-making have on successful implementation of strategy (Lorange and Murphy, 1984; Gupta and Govindarajan, 1984; Chakravarthy, 1986; Goold and Quinn, 1990; Goold, 1991). This research continues today, but it is more colloquially termed execution (Hrebiniak, 2005; Hrebiniak, 2006), and it incorporates a number of execution-oriented performance measurement frameworks (Kaplan and Norton, 1992; Kaplan and Norton, 2000b; Neely et al., 2000).

2.6.2. Performance Measurement and Management

Performance measurement research has accelerated in the past two decades, but the practice of both measuring and managing performance is not new (Neely, 2005). The earliest records of commerce-oriented measurement activity can be traced back to Mediterranean and Baltic societies around 1000 AD (Johnson, 1983). The double-entry accounting system that underpins account transaction entry today is believed to have been formalized roughly 500 years later in Europe by Venetian monks (Johnson and Kaplan, 1987).

Cost accounting began to emerge in England and then migrated to the Northeast region of the United States in the mid to late 1800s (Johnson and Kaplan, 1987). These early systems of operationally oriented accounting were developed further

during industrialization and in some respects were fully mature by the late 1800s (Chandler, 1977). As firms continued to expand production and scope, the techniques of strict budgetary control began to show adverse effects on the labor force. Budgets began their long-standing association with worker control and ever-increasing targets of performance (Ridgway, 1956). Gradually, measurement processes started evolving toward developing broader, more balanced sets of measures that were not solely budget specific (Drucker, 1954). Although the idea of a balanced set of measures was appealing in practice, the concept of sets of measures called into question the nature of all fragmented control thinking being published at the time.

Anthony (1965) described the first and still dominant conceptual framework in management control literature. The framework identifies three separate aspects of an overall system of control: strategic planning, management control, and operational (or task) control. What followed in the literature for approximately 20 years after Anthony's introduction were papers that expanded and added detail to this three-dimension control framework.

Processes for establishing systems of control were defined as were detailed activities such as control variable identification, performance tracking, and problem diagnosis (Lorange and Scott Morton, 1974). Case studies were conducted to aid movement toward achievement of specific organization objectives as well as to enhance overall systems designs (Ouchi, 1979). Behavioral problems associated with control systems were addressed during this period also (Merchant, 1982). Despite these advances in control thinking, challenges of control remained, and scholars sought means by which various performance measurement and control practices could be integrated into a more comprehensive evaluations of performance.

During the late 1970s as U.S. manufacturing competitiveness declined, researchers began examining the practices of leading manufacturers, in particular those in the automobile, steel, and technology industries. Findings indicated that cost-accounting practices failed to support the information needs of organizations attempting to increase productivity in the face of mounting foreign competition (Kaplan, 1983; Kaplan, 1984; Miller and Vollmann, 1985; Turney and Andersen, 1999). During the studies, deficiencies were identified not only with cost-accounting systems, but with enterprise performance measurement practices in general. Subsequently, influential papers were published that highlighted deficiencies in

measurement practices and recommended a variety of ways to improve performance indicators through more comprehensive, integrated frameworks (Cross and Lynch, 1988; Keegan et al. 1989; Brignall et al, 1991; Hronec, 1993). But these advancements were only frameworks, not systems to measure and manage performance comprehensively.

Unrest with disintegrated performance measurement practices peaked with the publication of "The Performance Measurement Manifesto" (Eccles, 1991). The article highlighted the shortcomings with short-term, financially based measurement, and it challenged researchers and practitioners to develop more comprehensive, long-term performance measurement systems. The following year, Eccles and Pyburn (1992) provided a set of steps and activities organizations might take to establish a comprehensive system to measure performance.

Dixon et al. (1990) developed the Performance Management Questionnaire, a tool that helped groups of managers assess the importance and priority of measurement information. Activity-based costing was developed at roughly the same time as a means to better handle the cost allocations that were being handled incorrectly in traditional costing systems (Kaplan and Cooper, 1998). The Balanced Scorecard was introduced (Kaplan and Norton, 1992) and served as the catalyst to move beyond basic measurement approaches into the area of research today called performance management and performance management systems.

Formalization of the field of performance management followed framework introduction as academics from the areas of management control area, strategy, marketing, economics and operations engaged in research. Research began to focus on understanding how entire systems of performance measurement and management were designed, established, implemented, and refreshed during their lifecycle (Bourne et al., 2000; Bititci et al., 2000; Bourne et al., 2002; Kaplan and Norton, 2000b; De Toni and Tonchia, 2001). The performance management systems questions currently atop the research agenda are concerned with dynamic measurement systems and the flexibility of measurement systems, which is the point of this inquiry.

2.6.3. Turbulent Environments

Much of the early research in environmental turbulence was conducted in the behavioral science arena (Pepper, 1934; Tolman and Brunswik, 1935). This research

crossed over to organization science during the early 1960s in Emery and Trist's (1965) paper "The Causal Texture of Organizational Environments." The authors note that organizations, like organisms, are impacted by changes in their environments. They provide a typology of four types of environments in which an organization can exist. The most difficult in which to survive is turbulent field, where organizations are moving within the environment itself. This turbulent field is an environment where "dynamic processes, which create significant variance's for the component organizations, arise from the field itself" (Emery and Trist, 1965, p. 26). Organizations, they note, cannot adapt solely through their own actions; they are interrelated to the actions of others in the environment.

Throughout the 1960s, organizational theorists examined how organizations adapted themselves to their environments. Burns and Stalker (1961) found that prospering entities had modified their structures, managerial routines, flows of communication, and employee interactions significantly from those that had not. They identified two separate management systems—mechanistic and organic. Mechanistic management systems were oriented toward stability and were characterized by specialization, precision in functional definitions, significant hierarchy, vertical interaction of members, and obedience, while organic systems, designed for changing conditions, lacked specialization and precise functional definitions. This finding spawned additional organizational research that sought to empirically validate differences in organizational forms (Lawrence and Lorsch, 1967; Child, 1972; Child, 1973). These studies identified structural differences among variables that had been previously presented by Burns and Stalker (1961), including specialization, standardization, documentation, centralization, and span of control.

Researchers in the 1980s—accepting that certain environments contribute more to uncertainty than others—began trying to identify which environments contribute most significantly. Hrebiniak and Snow (1980) studied 88 companies consisting of 247 managerial responses across four separate industries and concluded that differences exist by industry and that industry effects should be factored into empirical work. Dess and Beard (1984) in their analysis of task environments analyzed 23 variables derived from U.S. Census Bureau and Office of Business Economics information from 52 separate industries and concluded that SIC code as industry classification was a useful proxy for classifying task environments. Hrebiniak and Joyce (1985) examined the issue of organizational choice and environmental determinism. They provide a matrix that examines how

organizational choice and environmental determinism interact and produce different relationships. Their conclusion is that organizational adaptation is impacted by an ongoing dynamism between the organization's choices and the environment's response to those choices. Thus adaptation is not purely a function of the environment; firms can make conscious choices that impact the environment itself.

Environmental research into the 1990s presented two key findings. First, environmental conditions, when severe in terms of complexity and change, impact both organizational form and managerial decision-making. Second, some industries exhibit greater levels of complexity and dynamism than others. Research commenced that focused on the most turbulent industries—technology-intensive ones. The definition of technology in this study is consistent with the high-technology industry definition developed and used by Eisenhardt (1989b). Technology industries became popular units of analysis because they were experiencing rapid change, developing new applications such as the Internet, and also receiving a great deal of media and investor attention.

Research by Eisenhardt (1989b) provided rich insights into what is termed a "high velocity" environment. The claim that change was in fact continuous in nature in these environments was made (Brown and Eisenhardt, 1997). This finding was in contrast to the punctuated equilibrium model provided by other researchers at the time (Tushman and Anderson, 1986; Romanelli and Tushman, 1994). In-depth case-based research also chronicled the ways in which managers made decisions in these contexts (Bourgeois and Eisenhardt, 1988). Decision-making processes incorporated the use of additional information, cycled decisions through multiple organizational levels and considered, more analytically, a larger set of choices and alternatives.

Another product of the field research was creation of a model that could be used to improve performance through decision-making by organizations operating in high-velocity environments. These studies of high-velocity or turbulent environments continued throughout the decade as other researchers worked to understand the ways to improve strategic decision-making as well as to enhance firm profitability (Judge and Miller, 1991; Ansoff and Sullivan, 1993; D'Aveni and Gunther R., 1995; Burgelman and Grove, 1996; Bogner and Barr, 2000).

2.7. Literature Review

The purpose of this literature review is to examine the literature that informs the overall research question, "How do firms in turbulent environments measure strategic performance?" The review is conducted by systematic means—a formal process to search and identify pertinent literature and analyze it in such a way to ensure that relevant empirical studies, salient theories and other closely related reviews are incorporated into the empirical work that follows. In subsequent sections, the study approach is highlighted in detail.

2.7.1. Study Questions

In general terms, this study aims to understand what is currently known about how firms in turbulent environments measure strategic performance and what variables impact the design and use of strategic performance measurement systems. This research area is timely for several reasons. First, research in the performance measurement and broader performance management field has exploded since the 1990s (Neely, 2005). Much of this research focuses on fundamental performance measurement system design (Eccles and Pyburn, 1992) and the development and implementation of performance measurement frameworks (Kaplan and Norton, 1992; Neely et al., 2002). Less is known about the conditions that contribute to changes in performance measurement systems and how performance systems can incorporate elements of flexibility. To help address this shortfall, the initial stages of fieldwork following the literature review will be designed to identify and document the attributes of strategic performance measurement systems in turbulent environments. Once this is understood, the specific factors affecting the strategic performance measurement system will be isolated in order to discern how different conditions impact performance measurement systems and contribute to differences across multiple turbulent environments.

For purposes of conducting the systematic review, the following questions will be asked of the literature selected through the search and extraction process:

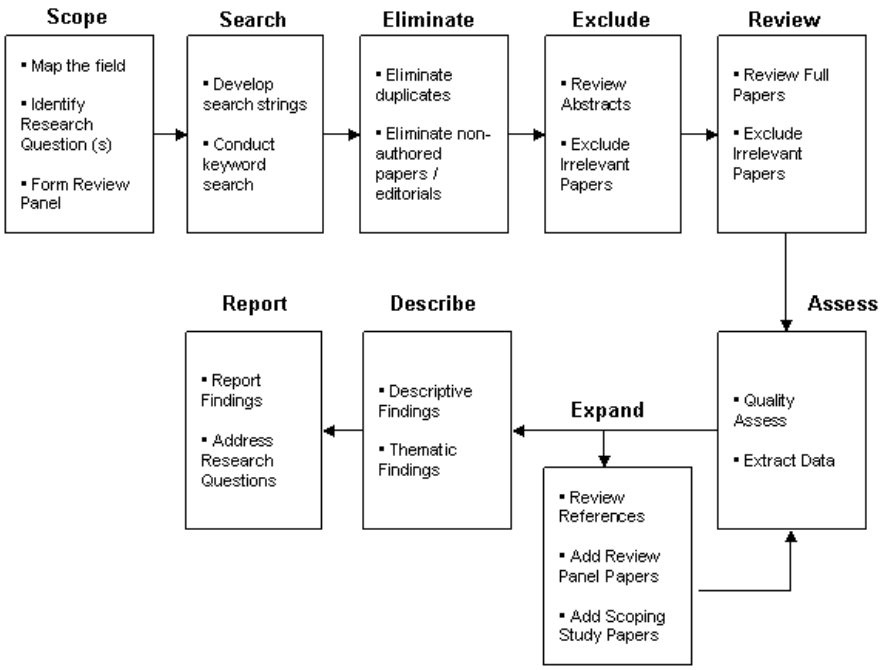
1. What challenges do managers face measuring and managing strategic performance in turbulent environments?
2. How do firms in turbulent environments measure and manage strategic performance currently?
3. For those firms within turbulent environments that employ strategic performance measurement and management systems, what elements are contained therein?

4. What factors affect the design of strategic performance measurement systems and management in turbulent environments?
5. How can firms improve strategic performance measurement and management in turbulent environments?

2.7.2. Literature Review Methodology

This section presents and discusses the methodology used for the systematic review of literature. The purpose of the review was to find support for the research questions identified in the previous section. The process shown in Figure 2-2 was followed to ensure that the review was carried out in a structured manner conducive to developing empirically based literature findings. Further, the process was executed in accordance with the general approach described by Tranfield et al. (2003).

Figure 2-2: Systematic Review Process Model



2.7.3. Literature Review Panel

Academic subject-matter experts and a senior-level practitioner comprised the literature review panel. The panel was consulted during the course of the review to

ensure that the full range of related articles and publications were considered during the process.

Table 2-1: Literature Review Panel

Name	Title	Expertise Area
Professor Andy Neely	Professor, Supervisor	Performance Measurement and Management
Professor Cliff Bowman	Professor, Panel Chair	Strategy
Professor Fred Nanni	Professor and Chair of the Accounting Division, Babson College	Performance Management, Strategic Cost Management
Professor Keith Rollag	Assistant Professor, Management Division, Babson College	Organizational Theory
Dr. Veronica Martinez	Researcher, Cranfield Centre for Business Performance	Performance Measurement and Management, Qualitative Research
Randy Russell	Vice President, Research Director, Balanced Scorecard Collaborative	Performance Management
Dr. David Denyer	Senior Research Fellow	Systematic Review Process
Heather Woodfield	Social Sciences Information Specialist	Search strategies, online information sources

Early in the review, as the initial stages of the review were carried out, ongoing contact with the supervisors, Dr. Veronica Martinez and Professor Andy Neely, ensured that the initial set of papers selected was of a sufficient quality and quantity to provide supporting evidence for the research questions. During the later stages of the review, external experts on the panel were consulted in order to identify additional studies; they added one additional book.

2.8. Search Strategy

The search strategy employed in support of the literature review is discussed in the following sections.

2.8.1. Information Sources

Four primary sources of information were used for the literature search: electronic databases, books, industry reports and thesis/working papers.

- *Databases.* Electronic databases-- ABI Proquest, EBSCO business source premier, and Science Direct—served as the main source of literature for the review. The search of electronic databases yielded 84 articles for review.
- *Books/Other Articles.* The balance of the books and articles for inclusions came from panel recommendations, through branching, and from literature previously covered in the scoping study.
- *Industry Reports*. Industry reports were added to provide information that was more recent information and/or practitioner oriented.
- *Theses/Working Papers*. One thesis was included that provided information on current, ongoing research in the field of turbulence.

2.8.2. Key Words

Table 2-2 presents key words used to conduct the review.

Table 2-2: Key Words

Literature Domain	Key Words
Strategy	Strategy and Implementation, Execution, Control, Management
Performance Measurement/Management	Performance and Management, Measurement
Turbulent Environments	Velocity, Turbulence, Hypercompetition, Dynamic, Dynamism, High Speed

2.8.3. Search Strings and Results

From the key words in Table 2-2, combinations of words—search strings—were developed in order to limit, refine, and focus the search. Words were paired and used in Procite and EBSCOhost generating an initial listing of results. The results were excessive in number—some individual searches produced over 14,000 hits. At the request of the review panel, strings of key words were created that represented logical groupings based on the research question(s). The first two literature domains—strategy and performance measurement—were grouped in particular in order to focus the search. "Strategy" with its related descriptors and "Performance Management" and "Performance Measurement" were used specifically since the purpose of the research is to understand more about the intersection of strategy and performance measurement with that of turbulent environments. The refined

search strings used for this research are listed in Table 2-3. For this search, only scholarly studies were reviewed. Relevancy estimates are noted qualitatively as "low," "medium," or "high.

Table 2-3: Search Results

Search String	Hits Proquest	Hits EBSCO-host	Hits Science Direct	Relevancy Estimate
(Strateg* formulation) AND (Turbulen* OR Hypercompet* OR Dynam* OR High Speed OR High Velocity)	52	43	12	High
(Strateg* implement*) AND (Turbulen* OR Hypercompet* OR Dynam* OR High Speed OR High Velocity)	27	16	12	High
(Strateg* execut*) AND (Turbulen* OR Hypercompet* OR Dynam* OR High Speed OR High Velocity)	2	4	6	High
(Strateg* control) AND (Turbulen* OR Hypercompet* OR Dynam* OR High Speed OR High Velocity)	8	10	69	High-Med
(Strateg* management) AND (Turbulen* OR Hypercompet* OR Dynam* OR High Speed OR High Velocity)	199	176	21	Med
(Performance measurement) AND (Turbulen* OR Hypercompet* OR Dynam* OR High Speed OR High Velocity)	109	63	313	Med
(Performance management) AND (Turbulen* OR Hypercompet* OR Dynam* OR High Speed OR High Velocity)	31	27	18	High
Total Papers: search results / title and abstract relevant	426	339	451	High

Note: As in other systematic review protocols, abstracts only were reviewed, not titles. Abstracts and titles represent separate search criteria within the databases. For this protocol, abstracts are considered more comprehensive than titles alone and the contents of a title would be expected to appear in the body of an abstract.

2.9. Selection Criteria

The search yielded a group of papers of manageable size. However, the list had to be pared down to ensure a more relevant set. Selection criteria were applied, first to abstracts and then to full papers.

2.9.1. Criteria for Abstracts

Table 2-4 presents the criteria used to include or excludes studies based on review of abstracts.

Table 2-4: Selection Criteria

Inclusion Criteria	Rationale
1. Papers that reference strategic management in turbulent environments	The focus of the study is understanding strategic control—a component of strategic management—in turbulent environments. Therefore, the topic of overall strategic management is relevant.
2. Papers that reference performance measurement or management in different turbulent environments	Performance measurement and management systems design, implementation, and use are key aspects of the study.
3. Papers that consider task or environmental factors that influence strategy or performance	Differences in the task environment or variances among task environments are key aspects of the study.
4. Papers that highlight problems of management with different task environments	Understanding ways in which companies cope with environmental differences in management are central to the study.
5. Papers that are not based on specific sectors or regions	The study is general in nature and concerned with the task environment versus geographic or industry location.
6. Papers that represent different time frames	Problems associated with managing in different environments have persisted for some time. Historical perspectives are equally relevant.
Exclusion Criteria	**Rationale**
7. Papers that do not contain the main themes of strategy, performance, and turbulence	Such papers are not relevant to the study.
8. Papers related to areas outside business strategy and performance management	Papers from domains such as medicine are not related to the study.
9. Papers in languages other than English	Sufficient English-language papers exist, and significant papers published in another language may be included if translated into English.

10. Papers published in journals rated by Cranfield as having fewer than three stars	High-quality research is most likely to be published found in top-tier, refereed journals.

The abstract review eliminated approximately two-thirds of the non-duplicate listing of papers. The majority excluded pertained to an area not relevant to the study, such as medicine, public policy, or networking, or appeared in a journal that failed to meet the quality criterion.

2.9.2. Criteria for Full-Text Papers

The quality assessment criteria of the Centre of Business Performance at Cranfield University's School of Management were used in order to select papers for data extraction and synthesis. These criteria are based on five elements:

1. *Theory Robustness*: knowledge of the literature and use of theories;
2. *Practice Implications*: usefulness of the main concepts to practitioners;
3. *Methodology*: rigor of the sampling, data collection and analysis for the study;
4. *Generalizability:* extent to which the findings can be used in different contexts;
5. *Contribution*: originality of the article to extant management research.

Papers were scored on the five quality assessment criteria. Table 2-5 shows the numerical scores and score descriptors for each criterion.

Table 2-5: Quality Assessment Criteria

Criteria	0-Absence	1-Low	2-Medium	3-High	n/a
Theory Robustness	Article does not provide enough information to assess	Poor awareness of existing literature and discussion. Inadequate referencing. Low theory validity	Basic understanding of the issues pertinent to the topic. Weak link between data and theory	Comprehensive understanding of the knowledge base and relevant literature. Strong theory-data link.	Criteria not applicable
Practice Implications	The article does not	Difficult to implement	Potential exists for the useful	Concepts and findings are	Criteria not applicable

	provide enough information to assess	the concepts presented in practice.	implementation of the concepts and ideas presented	highly applicable and readily usable by practitioners	
Methodology	Article does not provide enough information to assess	Techniques for sampling, data collection and analysis are poor	Sampling design, data collection and analysis are useful although strengthening is possible	Sample design, data collection and analysis are comprehensive and well done. Methods are strong	Criteria not applicable
Generalizability	Article does not provide enough information to assess	Limited to the context examined	Some cross application to other organizations or environments	High level of generalizability	Criteria not applicable
Contribution	Article does not provide enough information to assess	Does not make a meaningful contribution to knowledge	Makes a contribution by extending or expanding existing thinking	Significant advancement in knowledge with respect to the phenomenon of interest	Criteria not applicable

Papers that scored a 2 or greater on the quality assessment scale were selected for data extraction and synthesis.

2.9.3. Branching/Cross-Referencing

The entire set of references in each high-quality paper was reviewed in order to determine which papers or books were "frequently recurring," or appeared more than four times across the set of papers. Each of these was reviewed using the same quality assessment criteria as the original set of papers.

2.9.4. Data Extraction

For each study that met the selection criteria, data were extracted and placed into Procite, Excel, or both. Procite was used to capture bibliographic information, while Excel was used to capture descriptive, methodological, and thematic information. Excel was used primarily for ease of comparability across the data set and for

assistance in exporting data to the data tables contained in this report's appendices. The following information was collected:

- *Citation information,* such as author, title, journal, data, volume, month, pages;
- *Descriptive information* regarding the nature of the study, the location, the industry;
- *Methodological information,* such as the research question(s), methods used, data collection and analysis, study characteristics;
- *Thematic information,* such as key findings, key attributes, moderators or inhibitors, outcomes, conclusions, and other narrative information;
- *Theoretical information,* including the theoretical approach that is taken.

2.9.5. Data Synthesis

Synthesis was accomplished in two stages. First, data were aggregated by literature theme. Findings from papers in the areas of strategy, performance measurement and management, and turbulence were aggregated and discussed on a study-by-study basis. Second, the research questions were addressed individually using the theme-based findings. The thematic and research question findings were reviewed and used as a basis to develop the research model.

2.10. Descriptive Analysis

This section presents a descriptive analysis of the systematic literature review and the 60 studies identified for data extraction and analysis. Search results are presented first. Literature characteristics follows and describes the studies by general literature theme(s), time period, type of study, industries and locations, publication in which the studies appeared, and study data structure.

2.10.1. Search Results

Table 2-6 presents the final search results as well as results of the first four steps of the systematic review process: scope, search, eliminate, exclude. A total of 1,216 papers generated through electronic search were reduced down to 84 papers for quality appraisal. Of the 84 papers, 49 were removed because of failure to meet the quality assessment criteria. Thirty-five papers remained. To that number, three additions were made by the review panel,13 papers came from branching, and nine

papers came from the scoping study, yielding a final total of 60 papers and books for data extraction and inclusion in descriptive findings.

Table 2-6: Search Results

Search Step	Number
Search string results (Proquest=426, EBSCO=339, Science Direct=451)	1,216
Duplications	(190)
Eliminations (no author, book reviews)	(28)
Subtotal	998
Initial abstract screening (removed medical, policy, networking papers)	(614)
Subtotal	384
Inclusion/Exclusion Criteria	(288)
Subtotal for full paper review	96
Removed during full paper review	(12)
Final paper count for quality appraisal	84
Papers scoring below 2.0 for quality appraisal	(49)
Papers included in study from electronic sources	35
Papers/books added from advisory panel	3
Papers added from branching	13
Papers added from scoping study	9
Final papers/books included in descriptive findings	60

2.10.2. Literature Themes

The literature review sought to identify literature within three themes—strategy, performance measurement and management, and turbulence—that could provide answers or insight to the questions posed at the outset of the study. Table 2-7 shows the number of studies addressing the each literature theme. "Cross-over" themes identify studies that address more than one theme.

Table 2-7: Distribution of Studies by Theme

Literature Theme	Number
Strategy	27
Performance Measurement	4
Turbulence	8
Cross-over Strategy/Performance Measurement	3
Cross-over Performance Measurement/Turbulence	2
Cross-over Strategy/Turbulence	12

Cross-over All	4

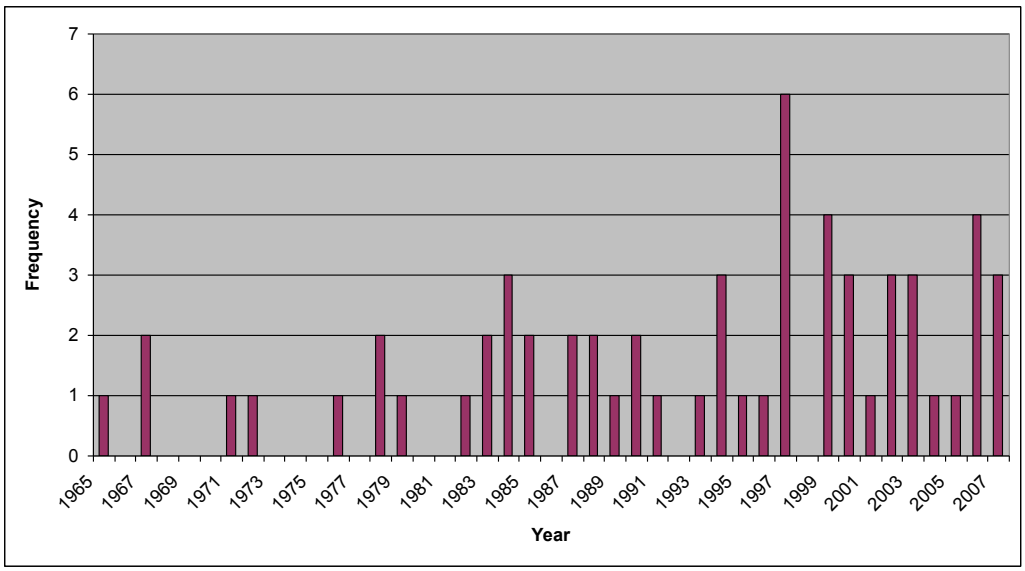
Detailed information pertaining to each of the studies is contained in Appendix 6.1. The majority of the studies pertained to strategy and the strategy-turbulence relationship. Less research has been undertaken in the area of strategy-performance measurement and performance measurement-turbulence, possibly due to the newness of the field as an area of scholarly inquiry.

2.10.3. Study Publication Dates

Figure 2-3 presents a frequency distribution of the publication dates of studies included in the systematic review. Although earlier works are cited in the initial discussion of the literature themes, they are not reflected in this graph because they were not a focus of the systematic review.

There were no restrictions placed on the timing of studies. Figure 2-3 shows that most of the final 60 studies appeared after 1985. This may be due to limitations associated with the age of literature contained in electronic databases. However, electronic database limitations are believed to be offset by both cross-referencing and by research panel recommendations.

Figure 2-3: Study Publication Dates



2.10.4. Type of Studies

Table 2-8 presents a distribution of studies by type. Empirical studies demonstrate the conduct of primary research. Theoretical studies provide a theoretical construct or framework developed from existing literature. Literature reviews discuss research and findings conducted over time within the literature domain. Texts—almost entirely strategy based—provide a mix of theory and practical application.

Table 2-8: Study Type

Study Type	Number
Empirical	36
Theoretical/Conceptual	16
Literature Review	2
Texts	6

Most of the studies reviewed were empirical in nature, as shown in Table 2-8. Empirical papers pertained mostly to strategy research. Conceptual papers were often focused on attributes of the environment and, in particular, dealing with complexity. The remainder provided research agendas or research recommendations.

2.10.5. Industries for Studies

Table 2-9 presents a distribution and density of studies by industry.

Table 2-9: Industry Type

Industry Type	Number
Diversified/Multiple	10
Manufacturing	5
Computer/High Technology	4
Semiconductor	3
Telecommunication	2
Insurance	2
Banking/Savings and Loan	2
Software	1
Health Care	1
Airline	1
Food	1

Industrial Metal	1
Aerospace	1
Oil	1
Chemical	1

2.10.6. Location of Studies

Most studies were conducted in in the United States or in Canada as shown in Table 2-10.

Table 2-10: Study Location

Study Location	Number
North America	25
Europe	9
Far East	2

2.10.7. Publication of Studies

The publications in which the studies appeared are shown in Table 2-11. Nineteen of the 60 studies were published in the *Strategic Management Journal* and *Sloan Management Review*, not unexpected given the strategic theme and focus of the studies.

Table 2-11: Study Publication

Study Publication	Number
Strategic Management Journal	14
Sloan Management Review	6
Academy of Management Review	5
Administrative Sciences Quarterly	4
International Journal of Operations and Production Management	3
Organizational Science	3
Long Range Planning	2
International Journal of Technology Management	2
Accounting, Organizations and Society	2
Journal of Management	2
Journal of Management Studies	2
Academy of Management Journal	1

Human Relations	1
Organizational Studies	1
California Management Review	1
Harvard Business Review	1
Journal of Information Technology	1
Columbia Journal of World Business	1
Management Science	1
Sociology	1

2.10.8. Data Structure

Study data structure is shown in Table 2-12. Consistent with the geographic locations of the studies and journals from which they came, most of the data was cross-sectional in nature. Cross-sectional research is characteristic of strategy research being conducted in the United States and is often criticized for not being particularly useful in the construction of theory. The modest amount of longitudinal work was generally more descriptive in nature and was consistent with work carried out for theory-building purposes.

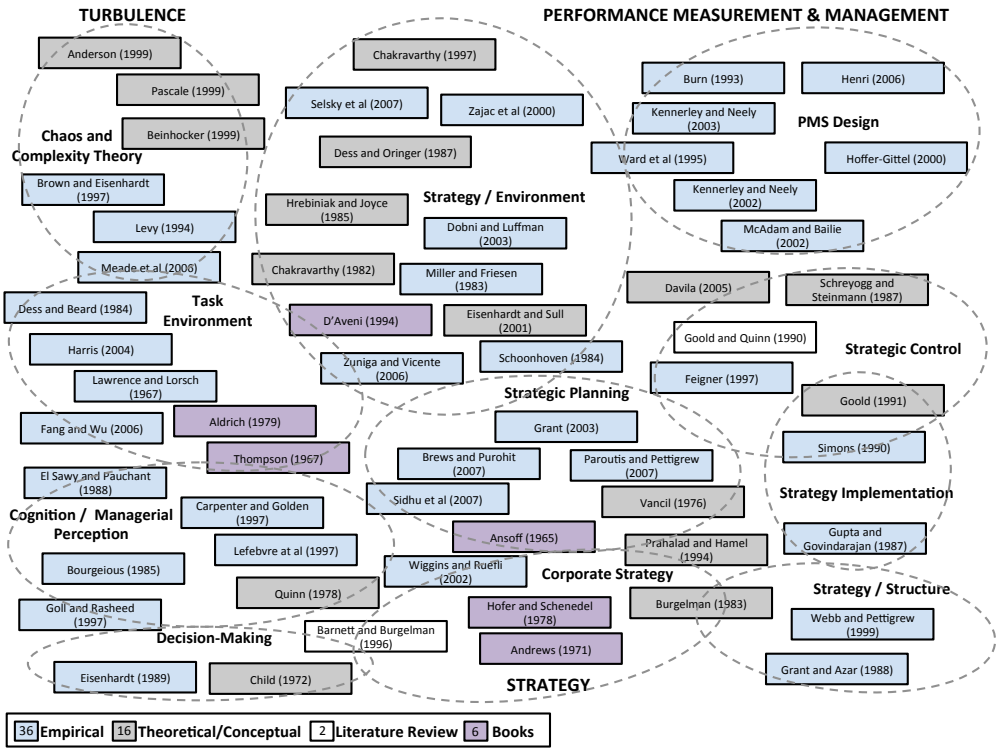
Table 2-12: Data Structure

Data Structure	Number
Cross-sectional	30
Longitudinal	4
Simulation	1
Cross-case	1

2.11. Thematic Findings

The thematic map in Figure 2-4 shows the literature from the search organized by the three main themes, and at a more granular level, by the subordinate theme that emerged as study was organized. It also shows how these and their subsets overlap.

Figure 2-4: Thematic Literature Map



This section discusses the 60 studies identified and analyzed in the systematic literature review—by main theme and the subset to which each belongs in the order of their publication.

2.11.1. Strategy

Most of the literature returned from the search was strategy-based, not unexpected given the long history of strategy research. What is surprising is the extent to which modern-day strategy research continues to reference first texts in the field. Early research findings seem as relevant today as when they first appeared, especially in the area of the environment. These early texts along with other related studies and concept papers are contained in the theme subset called corporate strategy. Related to corporate strategy and overlapping in terms of start time are the studies contained in the subset strategy and structure, research started by Chandler in 1962 and explored in depth during the early 1970s (Chandler, 1962; Rumelt, 1974). Some studies were found in the area of strategic planning. These pertained to the planning processes in turbulent environments. A single study came from the area of strategy implementation. Although the topic of strategy implementation is very

timely and well studied, no significant research was found linking implementation with turbulence. Most of the strategy studies reviewed pertained to the relationship between strategy and environment, which persists as an area of research even today.

2.11.1.1. Corporate Strategy

Corporate strategy is the focus of three books and three papers in the studies included in the systematic review. The oldest piece of literature in this review is Ansoff's (1965) seminal textbook *Corporate Strategy*. Considered the first comprehensive text in the field, the book effectively combines business policy guidance with analytical tools and detailed planning processes in a way that enables managers to make sound strategic decisions regarding the direction of the firm. He defines strategic decisions as those "concerned with external rather than internal problems of the firm" which is why it is contained in this study (1965, p 5). The tools and approaches highlighted provide insights, from the rational dimension, of how firms work to design the strategy-environment relationship.

A second seminal text is *The Concept of Corporate Strategy* (Andrews, 1971). Writings by Andrews and his colleagues at Harvard's Business Policy Group, (Learned et al, 1965) provide insights into the importance of a firm's successfully "fitting" itself into its environment. The environment is said to be composed of technological, social, economic and political influences. Andrews asserts that change is taking place constantly and that "change in the environment of business necessitates continuous monitoring of a company's definition of its business" (Andrews, 1971, p. 60). He also states "from the point of view of the corporate strategist, technological developments are not only the fastest unfolding but the most far-reaching…" and that "we see in technical progress a continually accelerating rate of change—with new developments piling up before the implications of yesterday's changes can be assimilated" (Andrews, 1971, pp. 60-61). Lastly, but perhaps most relevant, he finds "the principal consequence of technological advance for any company is the need either to engage in technical development or to maintain a technical intelligence capability enabling it to follow quickly new developments pioneered by others" (Andrews, 1971, p. 63).

The third book in the corporate strategy subset is Hofer and Schendel's *Strategy Formulation: Analytical Concepts* (1978). Widely referenced in subsequent research, it integrates in a clear, sequential manner much of the previous writing on strategy.

The authors' simple definition of strategy provides the basis for much of the research in the area of strategic management, "the basic characteristics of the match an organization achieves with its environment is called its strategy." (Hofer and Schendel, 1978, p. 4). Each of these books was added to the systematic review through branching, since each of them appeared numerous times in the references of the other papers used during data extraction.

Prahalad and Hamel (1994) challenge strategy researchers to look for a new paradigm in strategy research. They assert that both managers and academics failed to recognize tectonic shifts in the environment that were significant enough to cause a rethinking in how strategy research should be conducted. They list ten environmental factors driving industry transformation—all but one of which can be characterized as external to the firm. They remark that the basic premises of strategy research—that it is largely analytical and based on industrial organizations—need to change in the highly turbulent, complex global environment in which firms operate. They ask for new theories and theoretical lenses that can be used to explain the complex interactions firms and their environments today.

Barnett and Burgelman (1996) respond to the urgings of Prahalad and Hamel concerning evolutionary perspectives on strategy. They underscore the limitations of cross-sectional, empirical research, which examines phenomena at a single point in time. They assert that an evolutionary perspective is one that looks at how strategy develops over time, and they identify several consequences of this perspective on strategy research. They state that dynamic rather than static models can be used to predict the pace and path of change. Relating to this review, the theoretical model selected for a strategic performance measurement system should be created with the idea that it helps an organization sense and manage a dynamic strategy.

The paper by Wiggins and Ruefli (2002) is an empirical extension of those by Prahalad and Hamel (1994) and Barnett and Burgelman (1996). A large-scale study of 1,145 firms across 40 separate industries, it challenges the economic convention that firms, over time, will revert to the mean profitability for their particular industry (Wiggins and Ruefli, 2002). The researchers show that in each of the industries they studied, there were firms that achieved superior economic performance for ten years or more. Three firms achieved superior performance for over 50 years. This research highlights the limitations of positioning-based research while emphasizing

the theoretical value of the resource-based view of the firm. The authors posit in their discussion that achieving sustained economic performance "can only be achieved by strategies that are very skillfully implemented and adapted over long periods of time." (Wiggins and Ruefli, 2002, p. 100).

2.11.1.2. Strategy/Structure

Although some of the most noted strategy/structure research was conducted in the 1970s (Wrigley, 1970; Rumelt, 1974), strategy/structure research continues until today but in diminished volume and with different aims. Burgelman (1983) demonstrated in an extension of internal corporate-venturing research carried out during 1979-1980 that the proposition of "structure follows strategy" is only partially correct; in some cases "strategy follows structure." In his paper he notes that learning from internal corporate venturing/strategizing activities sometime yields results that have an effect on the corporate strategy. This would confirm the position held by researchers that strategy is adaptive and incremental in nature (Quinn, 1979).

Grant and Azar (1988) challenge traditional beliefs of related and unrelated diversification and find from their research that diversified firms outperform specialized firms and that there is no evidence that related diversification is more successful than unrelated. The implication for turbulent environments is that firms that are diversified may experience resource allocation advantages across environments. Although this suggests an increase in performance, it would also complicate the process of performance measurement.

Lastly, Webb and Pettigrew (1999) explore the patterns in strategy-making in the United Kingdom's insurance industry. This longitudinal and cross-sectional study—another response to Barnett and Burgelman's (1996) request—seeks to understand what the patterns of strategy are and how they emerge within a competitive set over a period of time. Of the nine firms studied, one was found to be a consistent early adopter and another a consistent late entrant. The authors conclude that early adoption is a function of strategic agility level and that agility results from successfully balancing four competing internal factors—strategy invention/implementation, industry norm maintenance versus innovation, executive experience mix (e.g. new/old) and internal structural fluidity (centralized/decentralized) (Webb and Pettigrew, 1999; p. 619). Each must be

successfully balanced while maintaining the ability to detect environmental change—the key point of this study.

2.11.1.3. Strategic Planning

Strategic planning literature is among the oldest and most influential in the modern era of strategy study. Its extent of use has rarely been questioned, but its efficacy has (Brews and Hunt, 1999). The first study addressing strategic planning is "Strategy Formulation in Complex Organizations" (Vancil, 1976). When it appeared, Vancil was a leading authority on planning systems along with Lorange (Lorange and Vancil, 1977). Most of the research conducted in the 1970s and 1980s was normative and sought to explain what constitutes an effective planning process. This paper was not different; it provides useful definitions for planning terms as well as strategy in general. More relevant, it discusses the challenges of strategy making and shows how strategy should be formulated and aligned—at multiple levels—within a firm as a set of interrelationships between individuals. Although the paper emphasizes planning as a formal process, it offers less about the formal process and more about the relationships and understanding of a common strategy between and among employees in an organization.

Grant (2003) explored planning practices of eight large oil companies in an effort to understand how organizations in turbulent environments had adapted their planning processes over several decades. He found that strategic planning continues to play a role in large-company management systems but that practices have changed over time. Strategic planning processes are more decentralized, more informal, whereas plans themselves are more short-term, more goal-focused with less regard to actions and resource allocation. Strategic planning is also less about decision-making and more about coordination and performance management. This is consistent with the original conception of a control framework authored by Anthony (1965). It is also consistent with Brews and Purohit's (2007) more recent research regarding strategic planning in unstable environments. In their large sample of multinational firms, they found that as environmental turbulence increases, so too does strategic planning. It is not the traditional, rational type of planning; rather, it is transactive and generative in nature meaning it becomes more continually adaptive and innovation oriented, respectively. Rational planning and symbolic planning, they conclude, are more closely correlated with firm size than environmental instability. This offers some insights into why and how firms continue to plan in turbulent environments.

Paroutis and Pettigrew (2007) explore the ways strategy teams practice strategy making. They find teams operate within and across teams and that their activities are both recursive and adaptive in nature and that their activities change over time as the strategic planning process matures. This provides support for Burgelman's (1983) and Grant's (2003) position that strategy making is often decentralized in practice.

The final study in this subset pertains to business domain definition (Sidhu et al., 2000). The researchers found that explicitly developing business domain definitions leads to superior performance in any environment but that in turbulent environments specifically, a narrower definition versus a broader one is correlated with sales growth.

Examining the studies in this subset collectively yields some useful insights. Strategic planning in turbulent environments persists today. However, its characteristics are significantly different from when strategic planning was started. It is reflexive and adaptive versus entirely rational. While having a centralized element, it has become significantly decentralized in nature. It emphasizes broader goals and targets as opposed to specific ones. It emphasizes organizational coordination rather than strategic control.

2.11.1.4. Strategy/Environment

The strategy/environment subset contains the largest number of studies in the systematic review. Further, it spans almost the entire review horizon if the corporate strategy texts of Ansoff (1965) and Andrews (1971) are included. Moreover, strategy/environment research continues today, which underscores the persistent nature of the challenges associated with maintaining a proper strategy-environment fit. Chakravarthy (1982) references Hofer and Schendel (1979) when he states "the process of continuously adapting to the changes in a firm's environment is called strategic management" (p. 35).

In his paper on adaptation, Chakravarthy (1982, p. 43) merges adaptation literature with strategic management research and produces what he calls a comprehensive framework for strategic management. The flowchart he develops poses a series of questions that can be used to assess goodness of fit. Where the fit is good, slack is generated and the firm is presumed to be properly fit into its environment. Where fit is poor, additional resources are required, strategic alternatives chosen or

adaptive abilities—material or organizational—need to be made to improve fit. The framework demonstrates that the maintenance of fit is an ongoing, dynamic process, but does not specify how a firm knows it has a poor fit other than it fails to generate sufficient slack.

Miller and Friesen (1983) wrote a paper frequently cited in strategic management literature that addresses the relationship of strategy making to the environment. Research until that point had largely focused on the relationship of strategy to structure and structure to the environment. But in their analysis of two separate samples—one of 50 Canadian industrial firm CEOs and one of archival data for 88 U.S. firms—they set out to understand the impact of three environmental variables—dynamism, hostility, and heterogeneity—on strategy making activity as well as innovation. Their testing found that increased environmental dynamism seemed related to more analysis and more innovation, hostility required more analysis, and firms in more heterogeneous environments benefited from increased innovation activity. Though not a main finding of the paper, they also state "organizations may be viewed as information processing systems whose viability depends on their ability to master challenges posed by their environment" (Miller and Friesen, 1983, p. 231). They also conclude "organizations must modify their structures to cope with the additional information processing requirements invoked by more dynamics, hostile or complex environments" (Miller and Friesen, 1983, p. 231). These findings suggest that a firm's information processing capacity is a key consideration when operating in a turbulent setting.

Exploring strategy making-environment fit in a highly turbulent environment is the purpose of research conducted by Schoonhoven (1984) on the U.S. semiconductor industry. She set to answer the simple question: Do semiconductor firms have strategies? Prevailing logic at the time was that they did not and, further, that traditional tools of strategy making did not function in the environment. By examining the 10 largest firms' performance over the period 1975-1979 and applying a Mintzberg-like strategy-as-pattern approach (Mintzberg, 1985), she was able to distinguish identifiable strategies among the firms. "What I found was that there are multiple realized strategies in evidence in the semiconductor industry" (Schoonhoven, 1984, p. 8). Further, she found some of the strategies yielded better results than others. With respect to her research question, strategies were indeed found in the high-technology, semiconductor industry. Presumably, these strategies need to be controlled or managed in some way.

In the late 1970s and early 1980s, discussion appeared in the literature on the nature of firm adaptation. Conflicting views existed: some saw adaptation as a function of strategic choice (Child, 1972); others as a byproduct of environmental determinism (Hannan and Freeman, 1977). In a conceptual paper, researchers Hrebiniak and Joyce (1987) assert that firm choice and adaptation are not akin to ends of a spectrum; rather, they are variables that mix in low and high combinations to produce occasions where choice is high/low or determinism is high/low. In each quadrant of a matrix, they describe the nature of adaptation. The implication of their typology is twofold. First, and most generally, choice and determinism impact each other. Second, organizations do have choices, but they are limited by the nature of the environment in which they are competing, and, thus, their adaptation may be externally driven. From a performance measurement standpoint, the performance measurement system should provide a moderating variable to help determine the level of adaptation possible given a set of environmental conditions.

Dess and Oringer (1987) review consensus in strategy-making literature and provide four research propositions intended to help construct theory around the consensus strategy-making process and consensus-performance relationship. They propose:

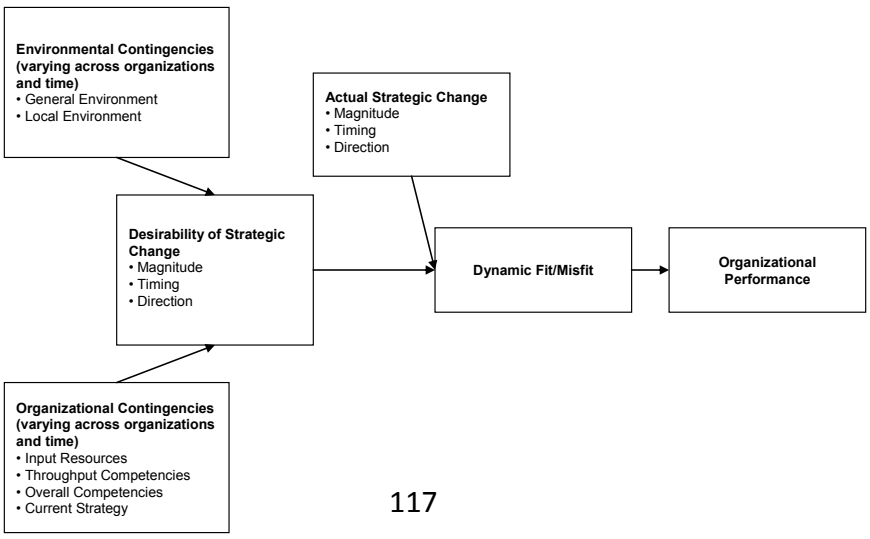
- There is an inverse relationship between munificence and both consensus on objectives and methods;
- There is an inverse relationship between environment complexity and dynamism and consensus on organizational goals and competitive methods;
- Higher-performing firms that compete in low munificence industries have higher levels of integrating structure;
- Higher-performing firms that compete in high munificence industries characterized by high complexity/high dynamism have a higher level of integrating structure than less successful firms.

In their discussion of the organization-environment interface, they briefly address the system an organization uses to obtain and process information. They note—from papers reviewed—that scanning beyond the immediate environment occurs but that all information gathering suffers from distortion as information is processed through the hierarchy of the organization.

Chakravarthy (1997) examined firms in what he terms the highly turbulent "Infocom" industry—media, entertainment, technology and telecommunication—in order to develop a framework for coping with turbulence. He examines in general the characteristics of the macro-industry, noting rapid innovation and the inability of firms to maintain leadership positions. He reviews the usefulness and limitations of Porter's five forces framework (1980), Hamel and Prahalad's competencies approach (1990), and D'Aveni's hyper-competition model (1994) in the Infocom setting to demonstrate the strength of his own model, which contains three elements: reconceptualizing strategy, sharing responsibility for strategy, and focusing on organizational capabilities. A sub-point within the area of sharing strategy responsibility is the view that organizations in turbulent environments are flatter and that information processing intensity increases within the organization (Chakravarthy, 1997).

In a study of 4,000 U.S. savings and loans, Zajac et al. (2000) provide perhaps one of the most rigorous cross sectional and longitudinal analysis of strategic change and strategic fit. Their study tests eight research hypotheses aimed at understanding how changes outside and inside firms affect a strategy change and ultimately firm performance. Their summary findings are that changes in firm strategy can be predicted based on changes in the environment and firm resources and that firms that deviate from their "model of fit" experience poorer performance. Their model of strategic change shown in Figure 2-5 contains two contingent variables: environmental (external) and organizational (internal) with desirability of strategy change being a function of change in these two antecedent variables.

Figure 2-5: Zajac, Kraatz, and Bresser's Theoretical Model of Fit (Source: Zajac et al., 2000)



They also highlight four scenarios when strategy may be changed to improve goodness of fit. A finding from their research regarding antecedents of strategic change is that "organizations appear generally able to recognize changing environmental situations and to assess their resource limitations" (Zajac et al., 2000; p. 448). Empirical work subsequent to this systematic review would seek to identify what mechanisms are used to recognize externally environmentally driven change.

The strategy-as-simple-rules concept (Eisenhardt and Sull, 2001) extends earlier research conducted in the high-velocity technology industry. The authors present their findings regarding strategy from investigations of firms like Yahoo that compete in complex, turbulent environments. In short, firms survive not by engaging in detailed, rational types of planning but rather by establishing simple rules in areas that include work performance, boundaries, priorities, timing and exit. The authors do not address the performance measurement mechanisms to accomplish this.

In their paper on market orientation and strategy implementation, Dobni and Luffman (2003) surveyed 210 managers at various Regional Bell Operating Companies in the United States and found that there was a relationship between market orientation and performance—specifically, that in certain environments there are optimal market orientation profiles that lead to higher performance. Sixty-one behavioral factors were assessed with questions that identified how well organizations collected both formal and informal intelligence and disseminated their intelligence.

Zuniga-Vicent and Vicent-Lorente (2006) examined adaptability empirically through a study of Spanish banks from 1983 to 1997, a period when banking was considered a turbulent environment. Using 1,257 annual observations of distributed financial data, they examined survival rates and demonstrated that adaptive behavior or mobility does have an impact on performance—in this case survivability—over time. The authors conclude this supports the view of constructive adaptability versus population ecology—a theory which cautions against making strategic moves.

The final paper in the strategy-environment subset (Selsky et al., 2007) reverts to some of the earliest challenges faced by strategy-environment researchers. This qualitative research study of two cases from the U.S. health care sector contrasts neoclassical strategy making with what the authors refer to as a socio-ecological approach, which draws from the turbulent field writings of Emery and Trist (1965).

The authors contrast the two strategy-making approaches and state that the neoclassical approach is unsuited for strategy making in a highly turbulent environment. Such an environment emphasizes the social field versus the firm and is characterized as a complex social system where strategic decisions affect the other actors, not only one firm. They conclude by questioning conventional means of strategy making and call for more research in the areas of researching the field versus the firm.

2.11.2. Cognition/Managerial Perception/Decision Making

Literature associated with cognition, managerial perception, and decision-making is the first subset of literature to emerge that was not considered during initial field mapping. The search results and thematic map show that significant empirical research has been conducted in this area extending from some early writings on rationality limits (March and Simon, 1958). Examining strategic performance measurement in conjunction with strategic decision-making provides insights into how managers might conceive a strategic performance measurement system regardless of the environment conditions that exist.

One of the most frequently cited works in the entire literature review is Child's (1972) theoretical piece entitled "Organizational Structure, Environment and Performance: The Role of Strategic Choice." Child examines existing theoretical models used to explain firm organization. He reviews environmental, technological, and size variables but concludes that common constraints are impartial in explaining structure. He suggests that the role of managerial choice has been overlooked and plays a greater role than previously thought.

A critically important paper in strategy literature is "Strategic Change: Logical Incrementalism" (Quinn, 1978). The paper actually spans two theme subsets: managerial perception/cognition/decision-making and strategic planning. It is addressed here, since it is foundational for other studies in this subset. Prior to this paper, much of the strategy research pertaining to strategic planning was of the normative, rational type. Quinn revealed, through his experience in working with organizations, that strategy could not be created rationally given the complexity of the task. Rather, strategy formed over time as a result of incremental steps that gradually changed managers' frameworks and ultimately their decision-making processes. Further, he asserted that organizations also possessed processing limits and that they could only progress incrementally over time. It is from this merging of

processes and decision-making that strategies emerge. This incrementalist view was validated empirically by El Sawy and Pauchant (1988) through their longitudinal study of 17 managers with data from the cellular phone industry. In their research they found that managers change or accommodate their cognitive frames—but only over time—through environmental scanning and subsequent group discussion.

Related to the concept of group discussion/consideration and environmental scanning is the study by Bourgeois (1985) of 99 top managers. His research provides insight into the relationship between strategic goals among top management teams, the common view of environmental uncertainty and performance of the firm. His testing yielded mixed support for his four hypotheses; what was clear however was the finding that congruence between perceived environmental uncertainty and environmental volatility is positively associated to firm performance. As he states, "perceptual acuity" will achieve higher levels of firm performance (Bourgeois, 1985, p. 565).

In a sophisticated study conducted with 84 CEOs from the Canadian industrial metal industry, Lefebvre et al. (1997) found that managerial perceptions of the environment had a significant impact on firm innovation levels and to a lesser extent, performance. Where in previous studies the environment itself had been a variable of analysis, the researchers assert that a more relevant variable may be managerial perceptions themselves. Carpenter and Golden (1997) considered managers' "locus of control" and the ways in which it impacted their perceptions of discretion. Locus of control is a personality characteristic that affects the extent to which a manager believes they have discretion to act in a given environment (Rotter, 1966). Their findings indicate—at a summary level—that a managers' locus of control may predict their perception of discretion level and ultimately the nature of their decision-making in certain situations or contexts. Extending decision-making from the rational standpoint, researchers Goll and Rasheed (1997) found that rationality is strongly associated with performance in highly munificent and highly dynamic environments.

Another key paper in this subset is the qualitative study of eight microcomputer companies by noted technology and high-velocity researcher Eisenhardt (1989b). She demonstrates that firms in high-velocity environments make decisions with more, not less, information and that they are able to develop more, not fewer,

strategic alternatives in the process of decision-making. These practices, when practiced within firms, lead to better performance.

The final study in the area of cognition, managerial perception, and decision-making is Fang and Wu's (2006) longitudinal case study of UMC, a Taiwanese semiconductor firm. The study concludes with the presentation of research propositions that state firms in a turbulent industry co-evolve by using micro-evolutional learning inside and macro-evolutional learning outside as a means of closing a technology based knowledge gap. These two forms of evolution are mutually dependent, and a firm has to have the means to incorporate externally learned knowledge into internal routines.

The studies in this subset offer several pertinent perspectives. First, strategy is formed incrementally as both processes and managerial perceptions shift over time. Second, this shift occurs by mixing environmental signals with group discussion with top leaders. Third, firms that are able to accurately sense environmental uncertainty and volatility experience enhanced performance, whereas managers who hold inaccurate perceptions of the environment limit the quality of their decision-making. Fourth, different perceptions regarding types of decision-making ultimately correspond to different performance levels within different contexts. Lastly, managers of firms in turbulent environments need more not less information and more alternatives to make better strategic decisions. This summary supports establishment of a strategic performance measurement system that helps managers sense a variety of signals quickly, discuss and understand their implications, change their cognitive frames where appropriate, and collectively be able gauge environmental uncertainty all the while.

2.11.3. Performance Measurement and Management

The searches conducted yielded scant performance measurement and management literature. It appears that little performance management system research has been conducted related to turbulent environments. Further, almost half the literature within the strategic control subset was the by-product of recommendations or the scoping study. This suggests that performance measurement and management relating to strategic performance or strategy control is an under-researched area within existing literature. Given that performance measurement is a subset of performance management, both will be presented here jointly as part of the literature review.

2.11.3.1. Performance Measurement and Management System Design

Early performance measurement literature cited in the introduction ranges from simple measurement design to comprehensive performance management system development. Some of this literature is conceptual—in particular the earliest. The later writings are more empirically based. Within this subset, all papers identified for the study are empirical.

Although research on performance measurement and management has been ongoing for decades, it seems to have formally come of age in the early 1990s. While not squarely situated within the research questions, the paper by Burn (1993) is related. It discusses strategic alignment of information technology with business strategy, which constitutes controlling in this case a functional strategy. From cited literature, Burn presents an organizational cultural assessment as a means of determining alignment and then tests the audit with 58 managers. Using the results, he creates a strategic alignment model. The instrument and model have potential applicability for empirical work related to this study which is why it was included. The study by Ward et al. (1995) examines the relationship of operations strategy, environment, and performance in 319 manufacturing firms. They found that the environment has a substantial impact on operations strategy; specifically, good performers adopt different operations strategies in response to environmental stimuli compared with poor performers. This is not surprising given the strategy-environment research reviewed previously. As was the case with Burn (1993), this study provides a useful model with which the researchers' measure selected environmental variables.

Hoffer-Gittell (2000) examined the differences between forms of employee coordination and control at multiple sites with four separate airlines based in the United States. In her comparative presentations, she concludes that different systems for achieving coordination and control can lead to significantly different outcomes. In particular, greater cross-functional accountability, smaller supervisory spans of control, greater selection for teamwork, and more active cross-functional conflict resolution are associated with higher quality performance and greater efficiency. The study, though not directly related to the design of a strategic performance measurement system, strengthens the argument for the use of informal versus formal forms of control in rapidly changing settings.

In an examination of business performance measures and strategy in the aerospace industry, McAdam and Bailie (2002) provide confirmation that an appropriate mix of measures yields the best alignment with the business strategy. They also note that measures are perceived as more successful when considered as strategic performance measures and directly linked to improvement initiatives explicitly mentioned in strategic plans.

Kennerley and Neely (2002, 2003) provide the first and only meaningful examination of performance measurement system evolution, in particular, evolution as related to changing business environments. From case study analysis, they present the elements of a performance measurement system: individual measures quantifying the efficiency and efficacy of action, sets of measures for organization as a whole, and the supporting infrastructure that enables data collection through dissemination (Kennerley and Neely, 2002, p. 1239). They note that external or internal triggers can prompt change, but that change is challenged by barriers such as poor processes, deficient people skills, systems inflexibility, and cultural resistance (Kennerley and Neely, 2002, p. 1240). They extend their research through the presentation of a model that shows the phases of performance measurement system evolution and demonstrate through a longitudinal case how an organization progresses to maturity in the use of its performance management systems.

Henri (2006), in a comprehensive study of 383 diversified using a resource-based approach, concludes that performance measurement systems used in an interactive (diagnostic) fashion contribute positively (negatively) to the deployment of capabilities of market orientation, entrepreneurship, innovativeness, and organizational learning. He confirms work by Simons (1990) on interactive controls and also makes the case that a performance management system can potentially be a source of competitive advantage.

2.11.3.2. Strategic Control

The first paper reviewed in the strategic control subset maintains the conceptual tradition of early strategic control writings. The paper by Schreyogg and Steinmann (1987) is an important element of modern strategic control literature. The authors present a strategic control model that incorporates three separate forms of control: implementation control, premise control, and strategic surveillance. Implementation control pertains to the monitoring of the actions or initiatives associated with the strategy. Premise control checks in an ongoing manner the

validity of the premises or assumptions on which a strategy was based—an aspect of control typically not actively included in most monitoring systems. Strategic surveillance is a threat-monitoring activity performed continuously to ensure challenges to the existing strategy are detected early and addressed.

This paper has implications for the development of the framework associated with this study. Existing strategic performance measurement systems seem to focus directly only on implementation control; they indirectly review, through performance analysis, premise control and strategic surveillance. This is where there should be an opportunity to advance the state of the art regarding an integrated performance measurement system by structuring these activities within an overall system of performance.

In the1990s, Simons published research regarding the use of management control systems and business strategy (Simons, 1990; Simons, 1994). In his examination of 70 top managers in 13 firms, he identified a process model that explains the way leaders use management control systems to control key aspects of their strategy. He notes there are four concepts underlying the model: limited attention of management, strategic uncertainties, interactive management control, and organizational learning (Simons, 1990, p. 135). Simons does not resolve the larger problem of a model for strategic control but rather isolates key components of a management control system in controlling specific aspects of a strategy.

Strategic control research seemed to begin in earnest with two related papers produced in 1990 and 1991. The first was a literature review of strategic control literature that provided insights as to how a strategic control system might be constructed (Goold and Quinn, 1990). The authors consider establishing a strategic control system in a high-turbulence environment "problematic" (Goold and Quinn, 1990, p. 55) and ask future researchers to consider whether or not businesses that "face especially high degrees of uncertainty, or in which strategy needs to be particularly flexible, pay less attention to strategic controls" (Goold and Quinn, 1990, p. 47). The second was an article that provides a description of control and strategic control, and discusses aspects of a strategic control system that are both formal and informal (Goold, 1991).

Fiegener (1997) seemed to accept the challenge posed by Goold and Quinn in his article "The Control of Strategy in Dynamic Versus Stable Environments." He

references Schreyogg and Steinmann (1987), Goold and Quinn (1990), Bourgeois and Eisenhardt (1988), and Lorange (1980) extensively. The research questions he addresses are the following: Do firms in different environments design their strategic controls differently, and are these control processes differentially effective in different environments? Based on his comparative study of 44 firms—29 in the life insurance industry (stable) and 25 in the software industry (dynamic)--he concludes that firms facing different environmental contexts should design their strategy assessment (i.e., control) systems differently. In particular, firms in "relatively stable environments should invest their efforts in formalizing strategy assessment procedures whereas firms in dynamic contexts would benefit from ensuring the greater involvement of line managers in strategic control activities" (Fiegener, 1997, p. 82). The latter point of his conclusions is consistent with the research conducted by Simons (Simons, 1990; Simons, 1994). However, he does not provide specificity on the design components of the systems described.

The final paper in this subset is conceptual (Davila, 2005) and provides guidance for analyzing the different roles that formal management control systems play in managing innovation. A model is proposed that incorporates three variables: components of strategy, organizational context, and the role of a management control system. The author discusses the dynamic nature of the management control system and notes that it must change with the strategy itself.

2.11.3.3. Strategy Implementation

Currently, publications in popular business books address the challenges associated with implementing strategy (Kaplan and Norton, 2000b; Bossidy and Charan, 2002; Neely et al., 2002; Hrebiniak, 2005; Barrows and Neely, 2012). This systematic review is concerned with this topic as it relates to turbulent environments. Interestingly, from a search standpoint, only one paper of significant quality was identified (Gupta and Govindarajan, 1984). It examines managerial characteristics and effectiveness in strategy implementation at a business-unit level. The researchers conclude in their analysis of 58 business units that "greater marketing/sales experience, greater willingness to take risks, and greater tolerance for ambiguity contribute to effectiveness in the case of build SBUs [strategic business units] but hamper it in the case of harvest SBUs" (Gupta and Govindarajan, 1984, p. 39). They highlight the importance of the findings with respect to the future use of contingency theory in researching both strategic and organizational variables.

2.11.4. Turbulence

Despite having a long-standing place in research (Emery and Trist, 1965), turbulence, the third main literature theme reviewed, is the least defined. Within both subsets of this theme—task environment and chaos and complexity theory—there is a narrow set of frequently referenced studies.

2.11.4.1. Task Environment

Task environment can be conceptualized as the relative ease with which an organization can accomplish its goals through receipt of the resources it needs to accomplish them. Thus, task environments can vary in terms of complexity (simplicity) as well as hostility (munificence). The papers discussed in the task environment subset all concern conditions of variation within the task environment, although at times indirectly.

The first study reviewed in this subset is Lawrence and Lorsch's (1967) classic study of six chemical processing companies. They found that in dynamic environments organizations must be able to manage a range of differentiating and integrating variables that at times conflict. To successfully manage this complexity, organizations must develop the capability to manage high levels of differentiation while maintaining a high degree of integration. Organizations use integrative devices to accomplish this—some more successfully than others.

Thompson (1967) provides an early yet surprisingly concise and comprehensive analysis of organizations in his book *Organizations in Action.* The book provides insights into organizational types, strategies, and forms of control, and is replete with propositions that are presented and addressed with organizational literature existing at the time. Useful specifically are the variables discussed that contribute to organizational uncertainty—two external and one internal: general uncertainty, contingency, and interdependence of components (Thompson, 1967, p. 159).

Dess and Beard (1984), aggregating Aldrich's (1979) six environmental dimensions, identified three dimensions that can be used to assess task environments: munificence, dynamism, and complexity. Their analysis of 52 manufacturing industries showed that multiple underlying variables could be loaded onto the three variables, thus providing a straightforward way in which to assess the characteristics of the task environment. The variables are used extensively in subsequent empirical

research presumably because of their ease of use and validity. Harris (2004) reexamined the convergent and discriminant validity of the variables, using a larger sample size of 247 organizations and the more sophisticated method of structural equation modeling. He concluded that the Dess and Beard (1984) variables have construct but not discriminant validity. Further, he recommends researchers revert to the six Aldrich variables or seek to identify another theoretical framework all together.

2.11.4.2. Chaos and Complexity

Complexity theory is growing in use in management research. Several researchers (Cunha and Cunha, 2006; Davis et al., 2009) have recently begun to establish its use as a viable theoretical paradigm to describe rapidly changing or dynamic environments. Levy (1994) examined chaos and complexity with a supply chain simulation and concluded from his analysis that industries behave like complex adaptive systems. Since change can happen unexpectedly, accurate forecasting is virtually impossible, so organizations operating within these contexts must become adaptive and flexible in order to survive.

Levy's views were advanced and strengthened by case-study research conducted by Brown and Eisenhardt (1997), who analyzed six firms in the technology industry. Their starting point was the premise that organizations no longer exist in an environment of punctuated equilibrium; rather, they operate in a state of constant change—whether it be incremental or radical. As such, traditional theories such as transaction cost economics and agency theory—theories developed in stable environments—are insufficient in terms of explaining behavior and performance (Brown and Eisenhardt, 1997, p. 3). They conclude that effective organizations—those that survive and adapt in these types of environments—create temporary semi-structures to aid in the management of the organization as well as links that connect existing work to probes or tests of new opportunities.

Anderson (1999) wrote a conceptual paper elaborating the specific elements of complexity theory while at the same time demonstrating its relevancy to organizational studies. The paper has become a mainstay in research conducted with complexity theory, since it clearly specifies how complex, adaptive, non-linear thinking can be incorporated into both management practice and research. At the same time, several articles published in the *Sloan Management Review* elaborated on the complexity concepts discussed by Anderson and showed how they were

applied in actual, versus speculated, practice. Pascale (1999) put complexity theory into more practical terms than Anderson by discussing Shell's efforts to disturb equilibrium. Beinhocker (1999) suggested the creation of "robust, adaptive strategies"—similar to Brown and Eisenhardt's (1997) semi-structures—and the use of "adaptive walks" to explore different elements of the shifting competitive landscape.

More recently and specifically, Meade et al. (2006) apply both chaos and complexity theories to technology adoption. In their study of the hard-drive, microprocessor, and semiconductor industries—done by examining total market share/product sales over time—they show how a complexity theory model called Adopter Framework is able to predict technology adoption rates over time and conclude by saying that it is likely the framework can be used in other examples.

2.12. Literature Review Findings Relevant to Study Questions

2.12.1. Q1: What challenges do managers face measuring and managing strategic performance in turbulent environments?

Hofer and Schendel (1978) state that the purpose of strategic management is to maintain a fit between the firm and its environment. Organizations able to maintain a good fit through their own adaptive behaviors perform better than those that do not (Zajac et al., 2000; Zuniga-Vicent and Vicent-Lorente, 2006).

From an external environmental standpoint, the process of maintaining fit is challenged in turbulent environments for two reasons. First, dynamism in both rate of change and magnitude of change is increasing based on speed and disruptiveness of ongoing advancements in technology (Andrews, 1971; Brown and Eisenhardt, 1997). Second, complexity is increased due to the continual emergence of new competitors and the rapid responses of existing firms, all of whom are vying for ideal positions within what amounts to a narrow competitive space (D'Aveni, 1994; Chakravarthy, 1997; Eisenhardt and Sull, 2001).

Internal to the firm, fit is challenged based on conduct and configuration. In turbulent environments, planning and coordination activities tend to occur more frequently (Brews and Purohit, 2007), in a more informal manner and in a more decentralized setting (Grant, 2003), and across greater boundaries (Lawrence and Lorsch, 1967) than would be evidenced in an otherwise stable setting. Complicating

strategic performance measurement in conjunction with organizational factors are both informational requirements and decision-making processes, which suggest that managers in turbulent environments need to examine more, not less, performance related information than their counterparts in stable environments as a precursor to making faster more higher risk decisions (Eisenhardt, 1989b).

Thus, challenges exist where the environment is changing more rapidly and dramatically than in stable settings; firms are structuring and coordinating in a more decentralized manner to cope with these characteristics, and yet at the same time, managers—who are known to be bounded in their thinking—require more information to support ever faster, higher stakes decision-making.

2.12.2. Q2: How do firms in turbulent environments measure and manage strategic performance presently?

The results of the systematic review of literature provided some, but not significant, insight into how strategic performance is measured and managed in turbulent environments currently. Based on Grant's (2003) findings from eight oil majors, strategic performance management overall seems to be done more informally, in a decentralized manner, incorporating greater flexibility with a greater emphasis on coordination versus control. These observations are consistent with Fiegener's (1997; p, 82) conclusions that firms in "relatively stable environments should invest their efforts in formalizing strategy assessment procedures whereas firms in dynamic contexts would benefit from ensuring the greater involvement of line managers in strategic control activities" and the finding by Simons (1990) that managers only focus on those control activities that drive their strategic priorities. Although it is clear that performance measurement systems evolve over time in response to environmental conditions (Kennerley and Neely, 2002; Kennerley and Neely, 2003), it is not clear which components evolve the most significantly, at what rate, or how they evolve in order to sustain the pace necessary to maintain congruence with environmental conditions.

These conclusions are consistent which what is anecdotally known about strategic performance measurement and management in turbulent environments today. Formality is seen as an inhibitor to performance, which would explain the lack of structure of the measurement data and modified use of performance measurement frameworks. Also, informality within top management team interactions is commonplace. The apparent assumption is that top teams are paying attention to

the right elements of their environment in the absence of clearly defined structure. This may or may not be the case.

2.12.3. Q3: For those firms within turbulent environments that employ strategic performance measurement and management systems, what elements are contained therein?

It is difficult to envision a situation in which a firm would measure strategic performance in the absence of a system or substructure of some kind, however informal it might be. This leads to the question of what elements would be contained in a strategic performance measurement, and broader management system, for an organization operating in a turbulent environment. The literature examined in the systematic review provided little detailed information pertaining to this question. Organizations—even in technology- rich settings—are known to have strategies (Burn, 1993), plan and manage strategic performance (Fiegener, 1997; Brews and Purohit, 2007), establish goals and programs (Goold and Quinn, 1990), and compensate for desired aspects of performance (Govindarajan and Gupta, 1984), and process more information faster (Eisenhardt, 1989b).

However, the most pertinent models for strategic performance management, or strategic control as it is called, are provided by Schreyogg and Steinmann (1987) and Simons (1990). Schreyogg and Steinmann's model of strategic control contains three dimensions: implementation control, premise control, and strategic surveillance. Although each component of this model may not be contained discretely in a comprehensive framework, it would be expected that managers somehow monitor and/or maintain awareness within each of these three dimensions. Therefore, an investigation into the elements of a strategic performance measurement system would likely begin with a search for how firms construct and maintain systems to support each of these elements of a strategic control system. In the Levers of Control framework of Simons presents four elements: belief systems, boundary systems, diagnostic controls and interactive controls. Belief systems reflect the core values of an organization. Boundary systems identify risks to be avoided. Diagnostic control systems are oriented on maintaining control of critical performance variables. Interactive control systems help managers attend to strategic uncertainties. Simons provides detailed information regarding the composition of performance measures for diagnostic systems but is less clear on performance measure used in interactive frameworks beyond discussing which systems can be

used to facilitate interactive control. The actual composition and functioning of these controls could be examined further during subsequent research.

2.12.4. Q4: What factors affect the design strategic performance measurement and management systems within turbulent environments?

Based on the systematic review as well as findings contained in the scoping study, four factors would likely affect the design of strategic performance measurement and management systems: environmental variables, organizational variables, technology variables, and managerial perceptions.

2.12.4.1. Environmental Factors

Several researchers have provided insights regarding the environmental variables that affect firm performance (Emery and Trist, 1965; Thompson, 1967; Child, 1972; Aldrich, 1979; Dess and Beard, 1984; Dess and Oringer, 1987). The most commonly referenced environmental variables are dynamism and complexity. Despite questions of validity (Harris, 2004), the variables are deemed sufficient for purposes of the model proposed in this research.

2.12.4.2. Organizational Factors

Historically, studies have used internal aspects of organizational control to aid in the determination of organization structure (Child, 1972; Duncan, 1976). These studies have measured independent variables, such as level of specialization, standardization, role formalization, centralization, and vertical span. Selected organizational variables—similar if not identical to these—are likely to be used in the study for predictive purposes.

2.12.4.3. Technological Factors

With respect to information processing, the internal technology environment would be expected to play a role. Variables would include volume of information and ambiguity of information, both of which can be tested within an analytical framework (Daft and MacIntosh, 1978).

2.12.4.4. Managerial Perception

Although environmental, organizational, and technological factors would seem sufficient to suggest an ideal design of a strategic performance measurement and management system, the essential variables would likely be moderated by managers' attitudes and beliefs regarding these systems (Kennerley and Neely, 2002) and by their frames of reference regarding the structure and elements of the system itself (El Sawy and Pauchant, 1988). These factors would impact the design of the system in addition to the other variables.

2.12.5. Q5: How can firms improve strategic performance measurement and management in turbulent environments?

Based on the systematic review findings pertinent to questions 1 through 4, it appears that there are three steps firms in turbulent environments could (and ultimately should) follow to improve strategic performance measurement in particular and strategic performance management overall.

First, the firms need to be able to understand and evaluate the variables that help gauge the level of turbulence within their environments. Although membership in a particular industry corresponds to turbulence levels (Hrebiniak and Snow, 1987), firms should develop the capacity to determine turbulence levels based on assessments of prevailing environmental conditions.

Second, firms should be able to identify and construct discrete elements of a strategic performance measurement and management system that correspond to the three elements of strategic control provided by Schreyogg and Steinmann (1987) and/or the Levers of Control identified by Simons (1990). Although both models are theoretical in nature, it should be possible to provide a description of the actual components in a way that can be assembled into an overall framework that supports strategic performance measurement.

Finally, firms should be able—from contingency and information processing perspectives—to determine from their ongoing evaluation of environmental variables the ideal construction of their strategic performance measurement and management system. In a simple example, firms that compete in less turbulent environments would develop strategic performance measurement systems that would likely de-emphasize the surveillance aspect of the system, given the relative stability of their environments, while placing additional attention on the control of implementation activities. Conversely, firms in highly turbulent environments would

orient their framework more toward surveillance actions and less toward implementation due to the highly volatile and disruptive environmental conditions that would likely persist.

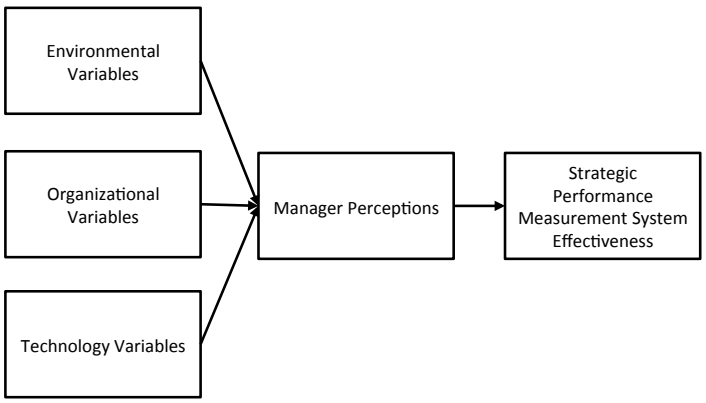
2.13. Synthesis of Findings

The thematic analysis and study questions summary serve as the foundation for the synthesis of findings. This section presents the analytical framework for initial examination and a discussion of its construction.

2.13.1. Analytical Framework and Variables

Figure 2-6 illustrates the analytical framework and component variables constructed to address the research question posed at the beginning of the study, "How do firms in turbulent environments measure strategic performance?" The framework was developed from the findings in the literature review discussed previously.

Figure 2-6: Analytical Framework



This framework will be used to empirically examine the development of strategic performance measurement systems in turbulent environments. As constructed, shows the relationship between three inputs and one moderator that impact the design and ultimately effectiveness of the strategic performance measurement system.

2.13.2. Environmental Variables

The first group of variables for the strategic performance measurement system determinants model is related to the external environment. The underlying

variables are derived largely from Dess and Beard's (1984) environmental construct and provide a means to consider various environmental conditions in empirical testing. Related environmental variables have also been considered including hostility, which is another means of determining environmental accommodation or munificence.

2.13.3. Organizational Variables

The second set of variables for the strategic performance measurement system determinants model pertains to the internal firm environment or organizational variables. If strategic management is the process whereby a firm is fit within its environment, then internal as well as external variables need to be included in the model. Specific, measurable variables might include specialization, standardization, role formalization, centralization, and vertical span (Child, 1973). Selected organizational variables—similar if not the same as these—will likely be used for predictive purposes.

2.13.4. Technology Variables

Technology environment would be expected to have predictive value with the model. Therefore, technology variables might include volume of information as well as ambiguity of information, given that both have been previously tested within an analytical framework (Daft and MacIntosh, 1978).

2.13.5. Managerial Perception

Despite an accurate assessment of external environmental and internal firm variables, variance may persist between what the firm is doing and what it ought to be doing from the standpoint of strategic performance measurement system design and use. Based on the literature review, it is likely the variation is moderated by managerial factors. There are two main moderators. The simplest is the top management team's attitude toward strategic performance measurement in terms of whether they deem the system valuable or not. The second factor pertains to their rationality or cognitive abilities. The top team may or may not have the have the cognitive skills or processing abilities needed to institute an effective strategic performance measurement system.

2.13.6. Strategic Performance Measurement System Effectiveness

The dependent variable in this model is the strategic performance measurement system effectiveness. The value of any performance measurement system—strategic or otherwise—is its value in helping managers deliver on critical performance expectations while helping navigate through the unknowns associated with a rapidly changing environment. The preliminary model indicates that appropriate construction of the independent variables coupled with awareness of the intervening variable should have predictive power in explaining what makes a strategic performance measurement system effective.

2.14. Conclusion

The literature provided by the systematic review has been examined comprehensively in the construction of this study. As with any study there are important limitations that must be acknowledged. Three limitations are pertinent to this study: limitations of the literature itself, limitations from personal biases, and limitations from the methods used.

2.14.1. Literature Limitations

Despite full employment of the techniques known to produce an effective systematic review of literature, the literature identified during the process was unbalanced and unequal in its coverage of the three main literature themes. Strategy papers were well represented in general. Selected subsets related to the turbulence theme were reasonably balanced, such as task environment and complexity, but the decision-making subset was less so. Literature related to the theme of performance measurement and management seemed to be the most deficient. Although a greater amount of literature was examined during the scoping study, most of it did not address the issues inherent in performance measurement and management in turbulent environments.

2.14.2. Personal Biases

As is the case with any individual researcher, there is inherent bias in this work. It is possible that this study has been too heavily influence by strategy research as strategic planning and strategy execution systems are areas of strong personal interest to the researcher. This may have caused the review papers that though related were not necessarily ideally suited for inclusion in this study. Further, the belief that literature from top-tier journals is more valuable than that from other,

lesser, publications may be a bias that led to excluding papers potentially relevant to this study.

2.14.3. Methods Limitations

Although the systematic review methodology prescribed by Tranfield et al (2003) is a documented and effective means to conduct a systematic review, limitations commonly arise in application. First, the review relies largely on key search terms and search strings, and these may not have completely scoured the databases selected. Second, the databases themselves, while expansive, are not exhaustive. Therefore, limiting the databases used may have caused papers to be missed. Finally, the cross-referencing and branching techniques used were subjective, and as a result, important literature may have been omitted in this portion of the search. To address the limitations, the review will be updated periodically with emerging research and other recommendations from the review panel.

2.15. Further Research

Although the systematic review of literature provided valuable insight into the research questions posed at the outset of the study, it is clear that further empirical research is necessary. This section proposes an approach for the second empirical project, subject to review and discussions with the review panel.

For the second empirical project, six to eight organizations in the high-technology industry in Boston (and potentially San Francisco) will be visited in order to conduct interviews with executives who design and use strategic performance measurement and management systems. These semi-structured interviews will be designed to explore and confirm the variables in the analytical framework presented in Figure 2-6. Based upon the findings, the preliminary model would be refined and readied for further exploration.

For the third empirical project, the model derived from the study of technology firms would be testing empirically in a broader sample of firms operating in turbulent or high-velocity settings. Alternatively, the model could be testing by examining it in depth in another industry setting using case based methods. The output of this research will be a better understanding of how firms in turbulent environments measure strategic performance as well as an improved/refined analytical construct with which to conduct empirical verification.

3. Project 2: Strategic Performance Measurement in a Turbulent Environment: Evidence from Security Software Firms

3.1. Abstract

3.1.1. Purpose:

This project reports the results of a technology industry study that explores the strategic performance measures used by, the features, roles and processes played by, and the contextual factors that affect, strategic performance measurement systems in turbulent environments. It also assesses how the strategic performance measurement system informs strategic decisions.

3.1.2. Design/Methodology/Approach:

Case studies are used to conduct exploratory investigations of seven security software firms with the United States. Using interview data from financial executives coupled with archival and published data, individual case studies are created and then analyzed to determine how strategic performance measurement systems operate in a turbulent context.

3.1.3. Findings:

As suggested by prior research, firms in turbulent settings use more measures, in greater depth and oriented on critical environmental variables, to measure strategic performance. Further, strategic performance measurement systems in this environment play the same roles and comprise similar processes as those in non-turbulent contexts. In contrast to published literature, strategic performance measurement systems are not balanced in nature. Further, they use a combination of measures and semi-structures to monitor uncertainty areas. Finally, there is some evidence that earlier and more frequent use of the strategic performance measurement system enhances strategic decision-making satisfaction.

3.1.4. Research Implications:

Based upon the research findings, a series of propositions are developed. To be effective, strategic performance measurement systems should align with critical

environment variables, consist of a greater number of measures in uncertainty areas, and should consulted early and often in strategic decision-making. Top management aims and attention moderates system overall strategic performance measurement system effectiveness.

3.1.5. Managerial Implications:

The research suggests that managers should focus their strategic performance measurement efforts on those environmental variables that have the potential for significantly affecting their firms and measure in depth in these areas. Further, they should employ measures and mechanisms to monitor uncertainty areas while using the strategic performance measurement system to inform strategic decisions.

3.2. Introduction

Over the past three decades, the field of performance measurement has matured around one essential premise: performance measurement systems need to be balanced in order to be effective (Eccles, 1991; Kaplan and Norton, 1992; Brown, 1994). Balanced performance measurement frameworks—like the Balanced Scorecard—are said to help managers examine their organizations in a comprehensive way while simultaneously limiting the number of measures used to do so. As both research and practice have pressed ahead, these frameworks have evolved from being stand-alone measurement devices into centerpieces of integrated, multi-stage performance management systems, the purpose of which is to enable effective performance management in the broadest sense (Kaplan and Norton, 1996c).

In the midst of this evolution, performance measurement continues to be challenged by increasing environmental turbulence. Rapid and ongoing change in external conditions requires firms quickly adapt their orientation and actions, sometimes more rapidly than performance measurement systems can accommodate. Eisenhardt's (1989b) research into high-velocity environments suggests that decision speed—a determinant of firm performance—is enhanced when key information is available in real-time. Real-time information is a challenge to generate, since comprehensive performance measurement systems can take upward of three years to fully develop. More recently, Eisenhardt and Sull (2001) argue that for firms to be successful strategically, managers need to avoid reliance on complicated frameworks and implement "simple rules"—heuristics that translate corporate objectives into a small number of easy to understand guidelines that orient both employee decision-making and action. It follows that these objectives would need to be evaluated using performance measures that themselves must be both streamlined and simplified at a time when the opposite seems to be true. The paradox exists, then, between the need for simplicity and parsimony in crafting strategy in turbulent environments and the highly complex performance measurement systems that are being used to manage those strategies today.

The purpose of this paper is to explore the ways in which firms operating in turbulent environments accomplish the complex task of measuring strategic performance. The setting is the security software industry. The study examines the performance measures in use as well as the features and processes employed by

firms in the industry to measure their strategies. It also considers the role of context in performance measurement system design. The study targets an important gap in the literature: despite the extensive research and practice in the area of performance measurement, little is known regarding how firms in turbulent environments measure performance and use those measures to make vital decisions. Further, it aims to contribute to the broader field of performance management in three important ways. First, the paper provides a detailed description of performance measures across a set of like firms operating in the technology industry. Second, it sheds light on how top managers use information from their performance measurement system to inform strategic decisions. Third, from the research, a set of propositions are developed that provide the basis for further examination as well as govern the construction of effective performance measurement systems by firms operating in fast-changing environments.

3.3. Performance Measurement, Strategy, and Turbulence

3.3.1. A Measurement Retrospective

Performance measurement as an area of study is not new. Early accounting systems, from which modern-day performance measurement is derived, can be traced back a thousand years to the rudimentary methods employed to monitor basic transactions supporting trade (Johnson, 1981). As the modern-era industrial organization came into being as a single-operation organization, maturing into multiple-division entities between the mid 1800s and early 1920s, managers began developing increasingly sophisticated cost-accounting techniques to evaluate and control firm performance (Johnson and Kaplan, 1987). Organizations like DuPont and General Motors employed techniques such as standard costing, variance analysis, return on investment, and various forms of budgeting to manage increasingly diverse industrial enterprises (Chandler, 1962). By the 1950s budgets were widely used throughout modern corporations, with estimates indicating their use in 95% of organizations surveyed (Sord and Welsch, 1962).

But from 1925 into the 1980s there was little advancement in the way of management accounting. Much of the emphasis in research and in practice was on financial accounting, a focus attributable to the U.S. Securities and Exchange Acts of 1933 and 1934. The aftermath of the U.S. stock market crash in 1929 was a multi-decade exclusive focus on financial reporting, evident in the increased number and the focus of accounting principles and practices promulgated from the 1950s until

today. Then, in the mid 1980s, the United States and much of the Western world came under heavy competitive pressure from Japanese manufacturers. Researchers began focusing their attention not only on quality concerns, but also on the reporting deficiencies associated with financial accounting systems, which were unable to provide an accurate gauge of manufacturing costs (Kaplan, 1983; Vollman, 1991). In response, a renaissance in management accounting took place that yielded activity-based costing (Kaplan and Cooper, 1998) and more focused performance measurement systems that were intended to surmount the challenges associated with financially driven accounting systems. Further, there was a sense that short-term operational performance was being emphasized at the expense of long-term strategy (Wheelwright, 1985).

Early performance measurement frameworks developed during this time were largely collections of performance measures intended to provide managers with a comprehensive view of performance. These included the supporting performance measures matrix of Keegan et al. (1989), the SMART pyramid of Cross and Lynch (1988), the framework for measuring operational performance developed by Dixon et al. (1990), the comprehensive system to measure performance by Eccles and Pyburn (1992), and the Balanced Scorecard of Kaplan and Norton (1992). These frameworks, which at the time reflected a structured and multidimensional way to aggregate and organize performance measures, were hailed as being balanced in nature. Balance had multiple meanings. Balance was achieved by the using financial and non-financial measures as well as by gauging various aspects of organization performance ranging from operations to customer satisfaction to innovation. These frameworks quickly morphed into structures that reflected causal chains of performance versus simple aggregations of measures. The Service Profit Chain (Heskett et al., 1994) links internal service quality with employee performance and profit. The Balanced Scorecard—reconceptualized into the strategy map—aligns organizational learning, process performance, the customer value proposition, and financial results (Kaplan and Norton, 2000a). It is also hailed as a device that aids companies in managing their strategies (Kaplan and Norton, 1996b). The Employee-Customer Profit Chain links employee behavior to revenue growth and return on assets (Rucci et al., 1997). The Performance Prism, which links strategies with processes and capabilities while delivering on stakeholder needs, reflects a comprehensive firm-environment ecosystem (Neely et al., 2002). A major contribution by researchers during this period, which is now embedded in modern practice, is the development of holistic performance measurement systems intended

to provide managers with a tool to comprehensively manage the strategy of a contemporary organization (Kaplan and Norton, 2008).

3.3.2. Strategy and Strategic Performance Measurement

Until the 1980s, when performance measurement practices became a key focus of researchers, strategy interest was mainly in the area of strategic planning. Long-range planning practices (Ewing, 1956; Payne, 1957; Wrap, 1957) were examined, explained, and ultimately linked by scholars to integrated performance measurement practices, whose purpose was to help managers better control overall organizational performance (Anthony, 1965). Long-range or strategic planning, as it became better known, grew into an important aspect of management practice; it remains so today, with upward of 90% of large organizations conducting strategic planning regularly (Dye and Sibony, 2007; Rigby and Bilodeau, 2011).

After 1980, strategy research moved away from the focus on strategic planning and planning systems (Steiner, 1979) toward a more in-depth examination of how firms achieve and maintain competitive advantage to include the drivers of that advantage (Porter, 1980, 1985; Pearce et al., 1987). It was at this point that management-control researchers started exploring how firms measure strategic performance (Vitale et al., 1994; Ashton, 1998). The Balanced Scorecard became an early standard (Kaplan and Norton, 1992, 1996a); however, alternate models were developed that explored the role of stakeholders in a broader perspective (Atkinson et al., 1997; Neely et al., 2002). By the early part of the new millennium, research focused on understanding how to design strategic performance measurement systems (Bourne et al., 2000) and on empirical examinations of how these systems functioned in practice (Banker et al., 2000; Ittner et al., 2003).

Through citation analysis, Neely (2005) explored the evolution of the field of performance measurement. His findings indicated that although the field of performance measurement has coalesced around a set of core questions, it is not mature, has not sufficiently professionalized, and lacks insight into a number of critical areas, such as performance measurement in dynamic environments. According to Neely, “Further complexity is added when one also takes account of the dynamic nature of organizations” (Neely, 2005, p. 1272). Recent studies on the implementation of performance measurement systems suggest that the typical implementation takes between 18 and 24 months (Bourne et al., 2000). Yet rarely are organizations stable for this length of time—especially in dynamic settings. Thus,

a significant challenge for the research community is answering the following question: "how can measurement systems that are sufficiently flexible to cope with the constant evolution of organizations be developed?" (Neely, 2005, p. 1272). Turbulent environments, with their unrelenting and unpredictable change, should provide a rich area in which to examine performance measures and performance measurement practices.

3.3.3. The Challenge of Turbulence

Organizations exist in environments comprised of numerous complex and highly interdependent variables. General economic conditions, government regulation, competitor behavior, supplier practices, changing technologies, and workforce configurations reflect areas in which performance must be monitored. Sometimes these areas change rapidly and unpredictably. Over the past 20 years—the last decade in particular—the level of turbulence has increased significantly. This period has seen the emergence of the Internet and the associated bursting of the technology bubble. War on a global scale has been a factor in the environment since 2001. The financial crisis of 2008 linked to lax lending practices generated regulatory changes that dramatically affect worldwide financial markets today. Evidence at the firm level shows that the 10-year survival rate for firms trading on the major U.S. stock exchanges between 1963 and 1995 was found to be 61% (Baker and Kennedy, 2002). Further, individual company volatility as measured by growth rates in revenues doubled between 1950 and 2000 (Comin and Mulani, 2006). The challenge of designing and using performance measures during significant and rapid change is substantial and still largely unexplored in the literature.

Turbulence is caused by two primary environmental variables: dynamism and complexity (Dess and Beard, 1984). Although other factors exist that impact turbulence—such as munificence—these two variables account for most of it. High levels of dynamism or instability are impacted by the speed of change (Fine, 1998). When dynamism amongst variables is coupled with high complexity—number and relationships among critical variables—strategy formulation and design of a strategic performance measurement system to support it become difficult.

In terms of strategy formulation, organizations have responded to increased levels of turbulence by becoming more adaptive. Beinhocker (1997) notes that increasing survival requires taking "adaptive walks," or incremental steps with an occasional leap to a higher fitness peak. Brown and Eisenhardt's (1997) study of six computer

firms finds that exploration and probes into the future that are designed like experiments aid in strategy design. The complexity of irregular and hard to predict change can be managed according to Sull and Eisenhardt (2012) by using "simple rules" to govern how an organization creates and aligns around strategy. Schreyogg and Sydow (2010) claim "achieving organizational flexibility remains imperative in increasingly complex and volatile environments" (Schreyogg and Sydow, 2010, p. 1251). These considerations, although effective in helping firms create and adapt their strategies, have a confounding effect on the design of an effective strategic performance measurement system.

Strategic control—the predecessor to strategic performance measurement—is predicated on clarity and stability. When these conditions are not present, performance measurement is impaired. Goold and Quinn (1990) note that designing strategic control systems in environments of high turbulence, where the ability to specify precise objectives is difficult, is "problematic." They highlight also the importance of empirical research in the area: "We therefore believe that further empirical research is greatly needed to explore more fully the sorts of strategic control processes that are most appropriate for different businesses" (Goold and Quinn, 1990, p. 53). In a study of 100 companies that examined strategic controls in both stable and dynamic environments, Fiegener (1997) found, in response, that "efforts to make the strategic measurement system more timely, relevant, and comprehensive pay greater dividends for firms in stable contexts." (Fiegener, 1997, p. 82). Further, he surmises that "the uncertainty inherent in dynamic environments makes it difficult for executives to trust the performance measurement system as a basis for making strategic adjustments" (Fiegener, 1997, p. 82). He concludes, noting if his belief is accurate, "then the use of elaborate strategic measurement systems such as the 'Balanced Scorecard' (Kaplan and Norton, 1992) may be more effective in stable environments" (Fiegener, 1997, p. 82).

3.3.4. Empirical Evidence

Current research in the areas of strategic performance measurement in turbulent environments is limited (Goold and Quinn, 1990; Fiegener, 1997; Schreyogg and Sydow, 2010). Grant (2003) conducted a study of seven oil majors where he found strategic planning has grown less formal and become more decentralized and direction-oriented with a greater emphasis on performance planning—identifying and targeting short- and medium-term goals associated with the planning process. The goals were typically oriented on financial targets, operating targets,

safety/environmental objectives, strategic milestones, and capital expenditures (Grant, 2003). In a survey of 886 firms, Brews and Purohit (2007) found that strategic planning increases as environmental uncertainty increases. However, the planning is more generative and transactive, meaning it emphasizes process innovation and is conducted more iteratively, respectively. Overall, however, there have not been significant advances either empirically or theoretically in the exploration of strategic performance measurement in turbulent environments. This study aims to do both.

3.4. Research Questions and Research Method

3.4.1. Research Approach

To investigate the composition and use of performance measurement systems in turbulent settings, an exploratory methodology was employed as opposed to traditional hypothesis testing. This was done for three reasons. First, little is known about performance measurement systems (Edmondson and McManus, 2007, p. 1161) in turbulent settings, so a major aim was collection of descriptive information regarding the content of the performance measurement systems and the processes whereby the performance measurement system was put in place. Second, it was important to understand what roles the performance measurement system played within the various firms in the study and how firm context impacted those roles. The uses of performance measurement range systems from measuring performance and managing strategy to influencing behavior (Franco-Santos et al, 2007). It was, therefore, deemed essential to see how the systems were used in this setting. The third purpose of the inquiry was to develop a theory to guide the development of performance measurement systems in this type of environment (Whetten, 1989). Although there is theory informing how performance measurement systems should be designed and evolved in general, it does not specifically address the complexities of turbulent settings (Bititci et al., 1997; Kennerley and Neely, 2003; Neely et al., 2000). Unlike environments where punctuated change occurs (Romanelli and Tushman, 1994), turbulent settings experience change that can be more or less continuous (Brown and Eisenhardt, 1997). The effect of this continuous change on the performance measurement systems was examined. In order to articulate a theory, it was essential to start with an investigation into the strategic performance measurement systems themselves.

3.4.2. Research Questions

The main question that the research addressed was: *how do firms in turbulent environments measure strategic performance?* To aid in the inquiry, four underlying questions were considered for these firms:

1. What strategic performance measures are used by firms operating in turbulent environments?
2. What features, roles, and processes comprise the strategic performance measurement system of firms operating in turbulent environments?
3. What contextual factors affect the design of a firm's strategic performance measurement system?
4. How does the strategic performance measurement system inform strategic decisions?

The existing literature cited in Section 2, the Systematic Literature Review, guided the conduct of this research. Based on the review of the literature, turbulent environments might have the following effects on the performance measurement systems:

1. Use of a greater number of measures. Previous performance measurement research has sought to distill strategic performance measurement systems into a vital few measures that provide insight into how the firm operates (Kaplan and Norton, 1992). Previous research conducted in turbulent settings suggests the opposite—that firms need more not fewer measures in order to enable effective decisions (Eisenhardt, 1989b).

2. Fewer, more precise objectives. Research conducted in turbulent settings previously indicates that firms focus their efforts on a few key performance objectives and rigorously monitor them (Muralidharan, 1997; Grant, 2003). Once those key objectives or critical objectives are identified, they become the primary focus of performance measurement. These ought to be manifest in the performance measurement system of the study firms.

3. Less formal processes. Where high turbulence exists, theory suggests that formality should be reduced in terms of processes and bureaucracy (Burns and Stalker, 1961). But empirical research on the effects of formality on rational processes such as performance measurement is mixed. Grant (2003) found in an examination of strategic planning processes of oil majors that the process had grown

in informality over time. Brews and Purohit (2007) in their examination of 886 multinationals found that increase process formality does yield positive effects in unstable settings. Given the potential need for more information, the expectation would be a reduction in formality to accommodate increased information processing.

3.4.3. Method

Because of the complex and multidimensional nature of these systems, case-study research was the primary means of investigation (Simons, 1991; Kennerley and Neely, 2002). Further, because of their complexity, turbulent environments have been examined largely with case-based techniques (Eisenhardt and Bourgeois, 1988; Eisenhardt, 1989b; Brown and Eisenhardt, 1997). This approach enables the generation of rich descriptions and identification of critical variables that often serve as the basis for further research. This inquiry adopted the same approach given the challenges associated with simultaneously researching both strategic performance measurement systems and turbulent environments. Further, case-based research using multiple cases enables analysis, both within and across cases, and facilitates the exploration of commonalities and differences to aid in theory construction—a major aim of the study.

3.4.4. The Research Context

The setting for the research was the security software segment of the computer software industry, as defined by Hoovers (Hoovers, 2008). Hoover's defines the overall computer software industry as "including companies that design, develop, market, and support systems and application software used in personal computers, servers, embedded systems, and mobile devices" (Hoovers, 2008). At the start of the research, the security software sub segment of the computer software industry comprised 221 companies that designed, developed, marketed, and supported software for managing security functions, such as user authentication, network access, systems administration, and facilitations access. This setting was chosen for three reasons. First, technology companies in general have been the most fruitful setting for exploring the topic of turbulence and high velocity. Due to the rapid, continuous, and highly disruptive changes that routinely occur in the industry, it has been the source of numerous studies that have proven highly influential and will likely continue to be (Eisenhardt and Bourgeois, 1988; Eisenhardt, 1989b; Chakravarthy, 1997). Second, software has traditionally dominated all sectors in

terms of merger and acquisition activity. In 2005, the software segment accounted for about 50% of all transactions with a value of $306 billion and in 2006 accounted for 40% of deals with a value of $298 per Thomson Financial. Third, cybersecurity is arguably the most important topic within the information technology industry and is growing in importance. In 2009, President Obama identified cybersecurity as one of the most serious economic and national security challenges facing the United States. As a result, the White House outlined The Comprehensive National Cyber Security Initiative, a compilation of 12 subordinate initiatives ranging from the deployment of intrusion detection systems throughout the federal government to developing and implementing a government-wide cyber counterintelligence plan (White House, 2009). In response, the Federal Bureau of Investigation made combating the threats posed by cyber attacks its top strategic initiative. Within the commercial sector, IBM reports that their mid- and large-sized clients experience an average of 90.2 security incidents per year (IBM, 2013). Cyber security reflects an area of vital importance for policy makers and executives at all levels.

To illustrate the high level of turbulence highlighted, only the study participants need be examined. During the course of this study, within the seven companies under investigation, the following corporate actions took place:

- 2006: ZBA was sold to a large data networking company, and Systemtron was purchased by a private equity firm[2].
- 2007: Net Watcher purchased their largest competitor.
- 2008: Cortona was purchased by Green Zone Networks (both firms participated in the study).
- 2009: Cognare and Cybereye were both sold to foreign-based competitors.

Interestingly, the specific firms chosen for the study were not selected based on any knowledge of potential or forthcoming business combinations prior to the start of the study; ongoing industry velocity was the sole driving force.

3.4.5. Data Collection

The initial selection of firms was made came from Hoover's list of security software firms in Massachusetts. According to TechAmerica (American Electronics Association

[2] All firm names have been changed to protect confidentiality. Any similarities between the names disguised names used in this study and actual firm names are purely coincidental.

at the time), Massachusetts ranked second in the United States in terms of high-technology employment with 11,000 jobs established (American Electronics Association, 2008). A search was conducted using Hoover's exclusively for firms within primary or secondary SIC code of 7372 (now NAICS Code 11210): Prepackaged Software. Based on these criteria, 29 firms, listed in Appendix 6.3, were identified as potential research candidates. Given the relatively small size of the target listing, no other search criteria were deemed necessary at this point. Of the original list of 29 firms, nine were contacted and five agreed to participate. Firms were chosen based on size of revenue. Revenues needed to be greater than $3 million but not more than $500 million. This approach would enable the study of companies at various stages of maturity and sophistication.

Once the target list was created, company websites were reviewed in order to gain an understanding of company products and services, general operations, and firm leadership. Chief financial officers were the primary point of contact because they are traditionally the executives responsible for designing, maintaining, and monitoring the firm's performance measurement system. Chief financial officers were contacted first by email and then by phone. Where possible, they were interviewed in person; they were interviewed over the phone when not. Also, in some instances, they provided access to other members of the executive team although this was typically not the case. Using a snowball technique, two additional organizations were added to the original sample when their chief financial officers agreed to participate. The final participant list is presented in Table 3-1. Interviews were conducted between 2008 and 2009. The interview protocol is provided in Appendix 6.4.

Table 3-1: Study Participants

Company	Revenues $	Interviewees	Timing
Green Zone Networks	$45 million (2007)	Chief Financial Officer (two interviews)	May and June 2008
Cognare	$22 million (2008)	Chief Financial Officer	July 2008
Cybereye	$10 million (2008)	Chief Financial Officer	July 2008
Cortona	$24 million (2008)	Chief Financial Officer	October 2008
Systemtron	$328 million (2007)	Chief Financial Officer	June 2008
Net Watcher	$280 million (2008)	Chief Financial Officer	July 2008
ZBA	~$500 million (2006)	Chief Executive Officer, Chief Strategy Officer, Chief Operating Officer, Vice President of Finance, General Manager, Security Division, Former, Chief Strategy Officer	March - July, 2008

One of the most significant issues was access to proprietary information—a major concern for the industry and the study firms in particular. In several instances, interviewees declined to make other executives available for fear that their colleagues might find inappropriate what they had shared in their interviews. Data provided for examination were typically required to be returned to the informant at the close of the interview. This made data collection and identification of multiple informants a major challenge of the study. Still, because the interviews were conducted with such high-level executives—who had visibility over all operations and intimate knowledge of the strategic performance measurement system—this was seen as offset.

3.4.6. Data Analysis

A dossier of information was created for each company prior to conducting the interview. This information—kept in rough form—enabled the researcher to engage in contextually relevant interviews with each informant. Each interview was recorded using a voice recorder. The recordings—which varied in length from 40 minutes to 90 minutes—were then transcribed by the interviewer using voice recognition software, an activity that starts the analysis process (Lofland and Lofland, 1995). Once each of the 13 interviews had been transcribed, it was reduced into a detailed literal abstract (Gersick, 1994). The detailed literal abstracts—about 40% as long as the original transcripts—enabled a better organization of the interview information into major categories, such as measurement, measurement process, and strategic decisions. Each literal abstract was then reviewed; marginal comments were added and interview comments pertaining to each of the four research sub questions were highlighted. When completed, these comments, augmented with information contained in the original dossiers, financial information from company filings, company press releases, subsequent reviews of the original interview transcripts, and other published information, such as industry reports, were recast into a case. The purpose of developing cases was not only to construct a richer picture of the firm and its informants; it was also designed to facilitate within-case analysis (Eisenhardt, 1989a). An example of a case is provided in Appendix 6.5. Including all seven cases would be impractical, since the total page count of the case exceeds 100, but they are available if needed on special request.

Each case was reviewed in depth in order to develop answers to the research questions—a process followed for each research question. Tables, process models, and other displays were developed to generate the information needed to fully

address each research question (Miles and Huberman, 1994). Once this was completed for each research question, information analysis was performed on a cross-case basis by comparing the analysis and responses for each question across the set of cases. Different data displays were built to examine the data in a comprehensive manner. At a high level, the data showed a unique set of patterns that transcended both company size and maturity level. The major themes and findings are discussed in Section 3.5.

3.5. The Main Characteristics of Strategic Performance Measurement Systems in Security Software Firms

3.5.1. Individual Performance Measures

The main goal of the first analysis was to develop an understanding of the strategic performance measures used by the seven study participants and the reasons behind their selection and use of these measures. To accomplish this, measure tables were developed from the interviews and internal data provided by interviewees. Each table was organized using identical categories that corresponded to each area of measure, including revenue, expenses, profit, and assets, and so on. Each firm's performance measures were placed in each category. Then each performance measure was described in detail by classifying unit, temporality (e.g., historic or predictive), purpose, frequency of review, and primary user of the information. Review frequency was noted using the following periodicity: daily (D), weekly (W), monthly (M), or quarterly (Q). An example of an individual measure table can be seen in Appendix 6.5, the Green Zone Networks case. When complete, a composite table was created in order to facilitate cross-case analysis. The composite is presented in Table 3-2.

Table 3-2: Performance Measure Composite

Measure/Company	Green Zone		Cognare		Cybereye		Cortona		Systemtron		Net Watcher		ZBA	
Area														
Revenue	10		5		6		7		9		7		5	
Breakeven Point	●						●							
New Revenue (Product/Market)			●		●	M			●					
Bookings	●	Q			●	D	●	W	●	D	●	W	●	D
Orders/Order Flow	●	Q					●	W	●	D	●	W	●	D
Sales in Aggregate	●	W	●	Q	●	D	●	W	●	D	●	W	●	D
Sales by (Product/Service)	●	W	●	Q	●	D	●	W	●	D	●	W	●	D
Sales by Geography	●	W					●	W	●	D			●	D
Sales Prospects	●	W	●		●	D			●	D	●			
Sales Quotas	●	Q							●		●	W		
Sales by Team	●	W												
Sales by Customer							●				●	W		
Leads	●	W												
Fees/Royalties			●											
First Year Contract Value					●	M								
Committed Revenue									●	D				
Expenses	3		1		3		3		1		2		5	
Expenses Overall	●	Q	●	Q	●	M			●		●	Q	●	Q
Salary/Headcount	●	W			●	M					●		●	Q
Marketing Expense	●	Q											●	M
Research and Development					●	M	●							
Quality Assurance							●							
Engineering Expense							●							
Travel Expenses													●	M
Sales Expense													●	M
Profit	2		2		2		1		0		2		2	
Gross Margins	●	Q	●	Q	●	M	●				●	Q	●	M
Profit (in total or by segment)	●	Q	●	Q	●	M					●	Q	●	M
Assets	4		0		1		2		2		0		0	
Cash	●	Q			●	M	●		●					
Cash Flow	●	Q					●		●					
Inventory	●	Q												
Account Receivable	●	Q												
Investment	1		0		0		1		1		1		0	
Capital Expenditures	●	W									●			
Return on Investment							●		●					
Customer	5		0		4		2		1		2		7	
Customer Satisfaction	●												●	
Product Trial Conversions	●	W												
Customer Issues/Escalations/Interruptions	●								●				●	
Product Trials	●	W									●			
Website Hits	●	W												
Customer Wins/New Customers					●	D	●				●		●	Q
Renewals					●	M								
Churn					●	M								
Account Activity					●	D								
Customers							●						●	Q
Rate of Adoption													●	
Customers with Multiple Products													●	
Number of Accounts													●	Q
Product	2		1		0		0		0		1		2	
Product Price			●								●		●	
Product Issues/Bugs	●													
Product Quality													●	
Product Change Requests	●													
Human Resource	2		0		1		1		0		1		2	
Headcount	●	W			●	M	●				●		●	W
Management by Objectives	●	Q												
Turnover													●	W
Market Oriented	1		3		0		0		2		0		5	
Market Size	●	Q	●						●				●	Y
Market Share			●						●				●	Y
Share Price			●										●	D
Combined Annual Growth Rate (CAGR)													●	Y
Growth Rate Versus Competitors													●	Q
Project	1		0		2		1		1		0		1	
Product Development Milestones	●				●	W	●	W	●				●	Q
Product Time to Market					●									
Other	0		0		0		0		0		1		2	
New Ideas											●			
Partners													●	
Licensing Agreements													●	
Number of Measures	31		12		19		18		17		17		31	

3.5.2. Performance Measure Characteristics

Although the focus of the study was the analysis of strategic performance measures, informants were universally unable to identify a set of strategic measures. As one vice president of finance noted,

> "I'm not sure we have strategic measures. We have a bunch of different measurements that we use to monitor how we're doing. I'm not sure we have any that we consider strategic. We might measure them against elements of the strategy but we've never done anything like, 'here' are our strategic measures and 'here' are our tactical measures. There's just a group of performance measures."

What respondents believed was that their measures reflected the critical information needed to evaluate overall business health. The number of measures initially appeared smaller than what might have been expected—the range of measures was from 12 to 31. Further, there was no particular association of the number of measures with firm size. Smaller firms collected nearly as many measures as the larger ones. Not surprisingly, because of their importance, these critical measures were reviewed more often than other measures that the firm tracked. One chief financial officer referred to his set of measures as "major metrics," metrics that merited most of the management team's attention due to their importance.

> "And that's where we as a team say, 'Okay, here's kind of where we are relative to the major metrics, not all of them but the major ones.' If we're there, we have to make adjustments somehow, depends on where the area is… They tend to be somewhat more operational than they are strategic."

Germane to all firms was the significant emphasis on revenue measurement. Chief financial officers indicated that revenue monitoring was by far the most important area they looked at. The high frequency of review was also an indicator of its importance. In six of the seven companies, revenue was measured daily or weekly. Revenue was viewed by all organizations as the sine qua non of organizational fitness. From the general manager of a security product division,

> "So number one, revenue. You're generating revenue with these new products. So your first measurement is, 'Are people buying? Are people buying the stuff you're selling?'"

and from the chief financial officer of a biometrics company,

> "We have this guy from McKinsey [on the board] who has a lot of useful things for us to hear about strategy and where our business is heading. The interesting thing is, you can talk about strategy until you are blue in the face, but even a guy like him, he'll say, 'Let's see some detailed numbers on revenue.' It always comes back to that. That is true north no matter where you are in the discussion—what's going on with revenue."

Revenue was the key business driver. However, revenue in aggregate was insufficient to provide the insights needed. For more in-depth insights regarding revenue timing and sources, overall revenue was decomposed into numerous subordinate measures. It was examined in total by every organization, but many firms—especially the mature ones—evaluated it by product or geography or whatever level of detail they needed to meet their information needs.

> "So we really looked at sales results….Yeah, it was essentially the sales forecast by region, by team. Not so much by product, not so much by product in the 2004-2005 time frame, it was just, 'what's the quarterly sales number? Are we going to get it? Is it coming out of Europe, the Americas, Asia? Within each region, which team is it coming out of?' And then in the 2005, 2006, 2007 time frame we started to measure more by product."

Driving revenue was bookings or order/order flow; these measures were considered to be in some cases the single most valuable piece of measure information available to firm management. They were seen as predictive in nature to the extent that they provided early insight into how the organization was performing in the area of product adoption. Bookings indicated what kind of revenue could be expected by the firm and, as important, the timing of that revenue. As examples, from one chief financial officer and a general manager from different organizations:

> "So the real issue is, 'Are bookings on track?' We will review bookings weekly. And we get a new forecast from the Vice President of Sales weekly, for the quarter."

> "What de we talk about when we are on track to make the quarter? When we look at bookings, we look at revenue, at bookings as the most important and we look at expense. We look at expense in the aggregate; we might look at department levels, but in general our expense discipline is very, very good. The real issue is, 'Are bookings tracking to plan?' We will review bookings weekly."

Revenue and its component measures were of such importance that several organizations used customized reports or technology applications to enable rapid, comprehensive revenue reporting from all areas of the business. This was the case regardless of firm size. From the smallest to the largest companies, firms utilized a rapid revenue-reporting system. From the smallest firm at revenue of approximately $10 million,

> "There's a sales pipeline report. We use a tool called Salesforce.com. It's the heart of what we do. It's up on everybody's--all the sales guys'--machines all day long. It really is the core of what we do for a sales perspective. It basically gives all their customers' status, their percentages, probabilities depending where we are in the sales process, and we've defined those previously."

To the largest firm, with revenue over $500 million, whose management team transformed the noun form of the word revenue into a verb,

> "The Speed Report is our lifeline to how we're doing at any given point in the quarter. That's a daily report on revenue. Where we are from a revenue perspective. We're booking new deals every day. We're revenuing every day. We're shipping secure products, we're recognizing ratably revenue on term contract. We're delivering professional services. I look at it every day."

And other firms in the analysis viewed revenue the same way, such as this perspective from a $250 million publically traded firm,

> "So every day we get reports such as shipment reports, a bookings report; we get product reports, product revenue reports. There is a reporting package that's put together every day."

A driver of revenue at all levels was customer behavior. Although tools like the Balanced Scorecard seek to explore customer measures such as loyalty and satisfaction, the firms in this study saw customer measures as a proxy for buying behavior (Kaplan and Norton, 1992). All but one firm had measures focused on some form of customer measurement used this way. Product adoption was used, customer churn or turnover, and product trial acceptance. Two firms would provide their customers with products to test and based on their level of satisfaction with these products, sales would often times materialize. This was seen as an important way to gauge future revenue.

> "If I had to kind of, in terms of the actionable data, I'd have to say the most actionable data was the statistics and the data on the [product] trials. That's something we can look at almost in real time. And the next set of most actionable data was the results against sales projections."

> "Really for us it started measuring our customer wins and our bookings attainment and we were laser-focused on order acquisition, knowing that at some point those would turn into revenue. We really were less focused on revenue and more focused on customer wins and orders and order flow."

The final major area of performance measures was expenses. All but one firm examined expenses in total, and four of the seven firms managed headcount or salary expense carefully. In technology firms, the largest cost area is that associated with personnel, and as such, it required careful management.

> "Some of the key drivers we look at weekly. And so, on expenses, a key driver is headcount across the board. At a high-tech company, expenses walk on two legs; they either cost money or they spend money. And so we track that weekly to make sure we're trending to where we're supposed to be."

Controlling expenses required chief financial officers to enact processes to manage expenses carefully. From headcount scorecards to hiring controls, several of the chief financial officers were personally involved with headcount and salary management.

> "We have a pretty tight expense controls process that keeps it pretty much in line in terms of hiring and purchase commitments. We have an annual hiring plan that is forecast by department. I approve all hiring personally. So I have tight control over that, so I'm pretty confident in expenses and we almost always run under the expense plan."

> "So in the last couple of years, we lived on headcount, hiring to headcount plan, purchases, and sales. Those were the kind of metrics we looked at on a weekly basis."

This analysis shows that together, revenue, customer, and expense measures comprised approximately 80% to 90% of the study firms' performance measures.

3.5.3. Differences Among Performance Measures

Exploring the composite measure data from Table 3-2 highlighted important differences. Most of these differences related to the emphasis and use of measures beyond revenue, customer, and expenses. Some firms, such as Green Zone Networks, had an ongoing focus on cash and asset management, whereas others, including Cybereye and ZBA, emphasized churn and adoption rates. In order to better understand these differences, the cases and interview transcripts were reviewed further. What started to emerge was a relationship of performance measures to business objectives—specifically, the main business objectives of the management team and, in many cases, the owners or key investors appeared to have an essential impact on the design and focus of the performance measurement system.

In order to explore the existence of the relationships, a display of business objectives to measures was developed for each firm, and associated with the governance structure as well. This information is summarized in Table 3-3, which shows, along with supporting qualitative comments, a relationship between firm-specific objectives and the selection of measures to gauge progress on those objectives.

Table 3-3: Relationship of Business Objectives to Performance Measures

Company	Revenue	Main Objective	Ownership	Representative Comments	Main Measure Areas	Representative Measures
Green Zone Networks	$45 million	Growth--New Markets	Venture Capital	"The new money guys came in and said, 'Is that enough?' And we went into a different market. That was in the middle of 2002 and at that point the engineering guys started mocking up the Blaster X product."	Revenue	Revenue by Product, Revenue by Geography
				"If I had to kind of, in terms of the actionable data, I'd have to say the most actionable data was the statistics and the data on the trails. Again, we were a growth company, we're not being asked by our investors to produce profits. We're being asked to produce growth.'	Customer	Product Trials
Cognare	$22 million	New Uses for Technology	Public	"A decision is made [by the CEO] based upon the basis that prosperity is right around the corner. There are new, the CEO will argue, licensees out there. And they need us to defend. And the numbers are just screaming this doesn't make sense. The qualitative arguments are starting to get weaker and weaker."	Revenue	Sales Prospects
				"I'd like to say that we are in three separate businesses with three separate strategies for the three businesses based upon pure logic and reason—thoughtful analysis of each of these markets. But I don't think we really do that. I think we're a lot more opportunistic. We look for applications of our technology or places where we think there may be opportunity to apply what we're good at."	Market	Market Size Share Price
Cybereye	$10 million	Growth--Focus	Venture Capital	Well it really revolves around those areas and the expansion into new clientele. It really revolves around the marketplace and our product. We are kind of, again, our strategy really focuses on those product lines and the expansion of product lines. It's really a product growth strategy. So it really revolves around products rather than technology at this stage of the game."	Revenue	New Revenue, Revenue by Product
				"Coming into this year—and this was kind of from the board down—we said we've got to focus. We know what we've been successful at so let's focus on that and grow from there as opposed to adding new product that are on the fringes of what we do."	Customer	Account Activity, Customer Wins
Cortona	$24 million	Growth--New Product Introduction	Venture Capital	"Really for us it started with our measure of customer wins and our bookings attainment and we were laser focused on order acquisition knowing that at some point those would turn into revenue. We really were less focused on revenue and more focused on cutomer wins and orders and order flow.	Revenue	Bookings, Order Flow, Sales (various)
				"In terms of performance reviews, I'll tell you what, our CEO was more involved than most I find. And it was very, very helpful for us in the team to have him do that. We had our staff meetings every Monday, every week and we would update in great detail bookings, quarter to date year to date and we would spend a lot of time on the product roadmap in those meetings."	Product Plans	Milestones
Systemtron	$328 million	Resale	Private Equity	"So every day we get reports such as shipment reports, a bookings report, we get product reports, product revenue reports. There is a reporting package that's put together every day."	Revenue	Sales Prospects, Sales by Product, Sales by Geography
				Our overarching issue here is, 'How do we get out?'. How do we create an opportunity for private equity investors to make money? We have a strategy that up until recently we didn't think was going to change. All we were going to try to do was technically within that operating strategy figure out how to maneuver to a point where we could go public or so.	Assets	Cash
Net Watcher	$280 million	Growth--Control Market	Public	It's mostly sales focused, it's not too financial and expense focused. It's mostly quota, sales attainment, that's the whole things we focus on, on a regular basis."	Revenue	Revenue by Product, Sales by Customer, Sales Quotas
				"Our strategy is to occupy and dominate our niche. In order to do it the best way we can we maintain technology leadership of this technical mechanism of staying close to customers in finding out what the marketplace needs next to go do that before the next guy does so that we maintain that leadership position and the barriers to switching. How do we measure that? We don't really.	Customers	Product Trials
ZBA	$500 million	Market Penetration	Public	"The Speed is our lifeline to how we're doing at any given point in the quarter. That's a daily report on revenue. Where we are from a revenue perspective. We're booking new deals every day. We're revenuing every day. We're shipping Secure IDs, we're recognizing ratably revenue on term contract. We're delivering professional services. I look at it every day."	Revenue	Order Flow, Books, Customer Adoption, Customers with Multiple Products
				"The idea being that we arrive at a beginning of June, beginning of July, strategic planning kick off with a few things under our belt that we know. All of that leads to the kick off meeting in the middle of summer from a process perspective. Art is fed a lot of this data and Art kind of acts as a mouthpiece, 'Here's what we think we should look like and here's where we want to go.' And then business unit leaders are missioned to go off and develop a plan that moves us materially in that direction."	Market	Market Size, Market Share, Growth versus Competitors

For example, Cortona had a board of directors and a chief executive who were very engaged in the daily running of the business. The firm had recently developed a new product and that was considered a major event since it was only the second product that they had produced. In addition to revenue growth, the chief executive was very focused on product roadmaps—the specific product release plans that govern new product development and deployment for most technology companies. According to the chief financial officer, the chief executive himself actually reviewed the detailed project management progress on a weekly basis.

> "In terms of performance reviews, I'll tell you what, our chief executive officer was more involved than most I find. And it was very, very helpful for us on the team to have him do that. We had our staff meetings every Monday, every week, and we would update in great detail booking, quarter-to-date, year-to-date, and we would spend a lot of time on the product roadmap in those meetings."

The new-product release was a high-risk event for Cortona, and the chief executive ensured that the firm's performance measures were geared to provide him with relevant information. Ultimately, the release was successful. Unlike Cortona, Systemtron was a firm that was struggling. Prior to going private, the firm was involved with a number of issues surrounding management team integrity and market performance. The firm was purchased by a private equity group who did so under a set of assumptions that they could grow the firm's revenue by exclusively focusing on sales, thereby enabling them to make a rapid exit. What they would not do was invest in products to deliver that growth. Their measurement systems supported this. They focused highly on revenue growth and share gains per the chief financial officer,

> "We don't have a very complicated market. Waxco owns 75% of this market. The rest of us fight for the other 25%. When you gain market share, you gain it from one of the other little players, you don't get it from Waxco. So your strategy comes down to how can you emerge as a credible alternative to Waxco, the one that people think of next is what all of us are trying to do."

Also, there were tight controls around cash because of the investors' unwillingness to fund the business any more than was necessary to support daily operations. The focus was really around share and selling the business. Again, per the chief financial officer,

> "We're growing at roughly 2% to 4%, so by definition we're losing share. The only way to generate an 8% growth market is to merge. So you say to yourself, 'If I'm going to provide an existing opportunity for the private equity guys, I have to clean this thing up as quickly as possible.'"

This was not the tenor at Systemtron alone. It was the perspective of every informant; the desires of the management team and top owners largely drove the focus of the performance measurement within the firm. Virtually all the differences could be accounted for this way.

Another unique feature of some of the performance measurements was the identification or search for indicators that were predictive in nature. Revenue, as described earlier, was examined at multiple levels to gain insight into market sensitivities by product, by region, and in some cases by customer. Customer measures served the same purpose in most cases—provide actionable data from which firm managers could gain insights. Three firms—Green Zone Networks, Web Watcher, and ZBA—tried to expressly identify measures or collect data that were more forward-looking and predictive. Green Zone Networks used product trials as the means to accomplish this. As the firm identified new customers, it would provide them with product trials and then use customer feedback from the trials to gain insights into future sales conversions. As the chief financial officer noted,

> "In terms of actionable data, I'd have to say that the most actionable data was the statistics and the data on trials. That was a real good way for us to measure how we were doing in the marketplace. So as we started to see customers take our trial equipment, we thought, 'Oh, something's going on here.'"

Unknowingly, the data on product trials appeared to grow into the most informative measures that they collected, even up to the board level,

> "And those guys would come into the board meeting and we would get to the formal presentations and show the trial successes and the financials and give them a little background on the marketing and all that kind of stuff. And then they would say, 'Alright enough slides. Turn the projector off.' And then they would just start talking."

Leading indicators were a premium for Green Zone, which was focused on growth at time. Web Watcher was not so focused on growth as they were on developing and maintaining a dominant position in their market. They too used predictive intelligence information from customers to do this, and although they noted that

they didn't have information for this, the measurement system showed that they did.

> "Our strategy is to occupy and dominate our niche. In order to do that the best way we can, we maintain technology leadership of this technical mechanism of staying close to customer in finding out what the marketplace needs and go do that before the next guy does so that we maintain that leadership position and the barriers to switching. How do we measure that? We really don't."

But Net Watcher did as they maintained trial data too. They also used other qualitative means, such as deploying engineers alongside sales professionals to help understand and shape their responses to customer needs. ZBA used a different means from measures to stay close to customers—an annual customer conference; still, they used customer purchase information as a means to generate insights regarding customer trends and behaviors.

3.5.4. Summary Performance Measure Findings

The performance measures examined in the study and presented in Tables 3-2 and 3-3 exhibit several important characteristics. First, the number of high-level performance measures used by the study firms is small. Thirty-one essential measures to direct a $500 million publically traded organization is a small number of measures. This number varies as firms change size; still, the largest number identified in the study was 31. However, many of these high-level measures are aggregations of more granular data, such as revenue by product line, geography, customer, and even business model. The number of underlying permutations is considerably higher when each of these measures is decomposed and compared to forecast performance at a detail level. As one manager noted,

> "It's sort of why we tend not to spend a lot of time on the simplified dashboards and we have much more detailed spreadsheets we're looking at on all the businesses so all the product lines, here's Form Factor, here's Ringlets, here's our licenses, here's our services businesses, and then we're looking at overall revenue performance. What are the relative expenses? We look at product line profit and loss statements. We're looking at measures more like that. You know the red, yellow, green? I'm somewhat cynical about it because it's just too

simple. I don't know if it's really red, yellow, or green until I look at the detail."

This finding is consistent with earlier propositions by Eisenhardt (1989b) that to make decisions in high-velocity environments more real-time data is needed.

The types of performance measures used are narrow and clustered around a few, critical objectives: revenue growth, the ultimate proxy measure for organization vitality; customer behavior, activity measures that provide insights into predictive customer purchasing and usage patterns: and expenses control, measures to track the expense consumption rate in line with forecasted revenue performance. Other measures were aligned with business objectives determined by the management team or the board of directors. The development of measures to monitor key objectives remains the same in turbulent settings as any other.

However, the measures themselves could not be considered to be a balanced set of measures—a finding different from what some scholars posit (Kaplan and Norton, 1992). Measures are much more focused toward key business objectives—in some cases common and in others firm-specific and driven largely by the aims of top management and firm owners. The features, processes, and roles of strategic performance measurement systems will be examined in the Section 3.6.

3.6. Features, Roles, and Processes of Strategic Performance Measurement Systems

The aim of the second series of analyses was to analyze the feature, processes, and roles contained in the study firms' strategic performance measurement system. According to Franco-Santos et al. (2007), "the *features* of a business performance measurement (BPM) system are properties or elements which make up the BPM system; the *processes* of a BPM system are the series of actions than combine together to constitute the BPM system; and the *roles* of a BPM system are the purposes or functions that are performed by the BPM system" (Franco-Santos et al., 2007, p. 787). In order to explore the characteristics of the performance measurement system within the study firms, the cases and interview data were used to develop two primary displays, both for cross-case analysis. The first, Table 3-4, compares the features and roles of each system to one another. This helped identify common as well as divergent aspects. The second, Figure 3-1, is a series of process diagrams, constructed again from case data that enabled not only cross-case

comparison but also development of a generic strategic performance measurement process reflective of the main features of all of the firms—seen in Figure 3-2. In this study, what was examined was the strategic performance measurement system—the system that emphasizes measurement of strategy. Thus, the definitions of a business performance measurement system were used as background, but the analysis was aimed at only features, processes, and roles of performance measurement associated with each firm's strategy and strategy processes.

3.6.1. Features and Roles of the Strategic Performance Measurement System

Section 3.6.1 first presents the features of the study firms' strategic performance measurement system and then explains the roles that strategic performance measurement system plays. Table 3-4 is used to support both subsections.

Table 3-4: Features and Roles of Security Software Firms' Strategic Performance Measurement Systems

	Performance Measures	Functional Plans	Reporting System	Interactive Component		Performance Reviews	PMS System Roles	Objectives
Green Zone	31 Total 12 Weekly Review 13 Quarterly Review 6 Unknown Review *Key Measure Areas:* -Revenue -Customer *Key Measures:* -Sales Results -Product Trials	Strategic Plan Operating Plan Sales Plan/Sales Forecast Product Development Plan/ Release Cycle Expense Plan Hiring Plan Sales Compensation Plan	Excel (Manual) Reporting Product Bug Reporting	*Component:* Sales Teams -Sales Representative -Sales Engineer Customer Support -Customer Support Reps	*Purpose:* Maintain Customer Contact Provide Product Feedback	Sales Reviews (weekly) Management Team (weekly) Financial Reviews (Quarterly) Strategy Reviews (Three times/Year) Product Plans (Ongoing) Human Resources Plan (Annually)	Manage Strategy Measure Performance Manage Products Communicate Performance Infuence Behavior Adapt the Organization Detect Signals	Grow the Firm Identify New Markets & Products
Cognare	12 Total 5 Quarterly Review 7 Unknown Review *Key Measures:* -New Revenue -Revenue by Product/Market	Strategic Plan Operating Plan Sales Plan/Sales Forecast	Excel (Manual) Reporting	*Component:* Sales Team	*Purpose:* General Market Awaremess	Strategic Reviews (Annually) Financial Reviews (Quarterly) Sales Reviews (Unknown) Operating Reviews (Unknown)	Manage Strategy Measure Performance Communicate Performance Influence Behavior Adapt the Organization Detect Signals	Grow the Firm Identify New Markets & Customers
Cybereye	19 Total 6 Daily Review 1 Weekly Review 11 Monthly Review 1 Unknown Review *Key Measures:* -New Revenue -Bookings -Customer Activity	Combinted Strategy/Ops Plan Sales Plan/Sales Forecast Product Development Plan/ Release Cycle Compensation Plan	Salesforce	*Component:* Sales Team Customer Advisory Council	*Purpose:* Customer Awareness Solicit Customer Ideas Regarding Product Features	Sales Reviews (Daily & Weekly) Management Team (Bi-Weekly) Product Reviews (Bi-Weekly) Financial Reivew (Monthly)	Manage Strategy Measure Performance Manage Products Communicate Performance Influence Behavior Adapt the Organization Detect Signals Benchmarking	Grow the Firm Find New Customers Focus the Products
Cortona	18 Total 6 Weekly Review 12 Unkonwn Review *Key Measures:* -Bookings -Schedule Attainment	Strategic Plan Product Development Plan/ Release Cycle Engineering Resource Plan Resourcing Plan Revenue Plan Sales Plan Financial Plan	Excel (Manual) Reporting	*Component:* Sales Team	*Purpose:* Assess Customer Needs Provide Product Feedback	Sales Reviews (Weekly) Product Reviews (Weekly)	Manage Strategy Measure Performance Manage Products Communicate Performance Influence Behavior Adapt the Organization Detect Signals	Grow the Firm Introduce New Products
Systemtron	17 Total 7 Daily Review 10 Unknown Review *Key Measures:* -Revenue -Cash, Cash Flow	Product Development Plan/ Release Cycle Revenue Plan/Sales Plan Financial Plan	Salesforce	*Component:* Sales Team	*Purpose:* Proof of Concept	Sales Reviews (Daily) Issues Reviews (Daily) Management Team (Weekly)	Manage Strategy Measure Performance Manage Products Communicate Behavior Influence Behavior	Grow the Firm Conserve Cash Exit
Net Watcher	17 Total 6 Daily Review 2 Quarterly Review 9 Unknown Review *Key Measures:* -Revenue -Cash, Cash Flow	Operating Plan Sales Plan/Sales Forecast Expense Plan Hiring Plan Sales Compensation Plan	SalesLogix	*Component:* Sales Team -Sales Representative -Sales Engineer	*Purpose:* Solicit and Communicate Customer Needs Regarding Features	Sales Review (Weekly) Financial Review (Quarterly)	Manage Strategy Measure Performance Communicate Performance Influence Behavior Detect Signals Adapt the Organization	Grow the Firm Create Dominant Position Maintain Customer Proximity
ZBA	31 Total 6 Daily Review 2 Weekly Review 5 Monthly Review 9 Quarterly Review 3 Annual Review 6 Unknown Review *Key Measures:* -Revenue -Performance vs Competitors	Strategic Plan Operating Plan Sales Plan/Sales Forecast Product Development Plan/ Release Cycle Expense Plan Hiring Plan	Speed Report	*Component:* Sales Represntiatives Product Mangers Industry Conference Strategy Study Teams	*Purpose:* General Feedback Understand Needs Shape Industry Understand Trends	Strategy Review (Annually) Sales Reviews (Daily) Operating Review (Monthly) Product Reviews (Quarterly)	Manage Strategy Measure Performance Manage Products Communicate Performance Influence Behavior Detect Signals Adapt the Organization Benchmarking	Grow the Firm Shape the Market

3.6.1.1. Features

From a structural standpoint, a business performance measurement system needs to contain two basic features: a set of performance measures and a means of reporting the information generated by the performance measures (Franco-Santos et al., 2007). Both of these features were present among all the firms in the study.

Measure detail and review information is presented in Table 3-4 however, because it was discussed in detail in Section 3.5, it will not be reviewed again. In terms of reporting, all of the systems were supported by a reporting system. All reporting systems were enabled by technology—some were composites of various systems. Microsoft Excel was used extensively and in three cases, a web-based software application was used to track reporting information. Large firm's like ZBA used Excel to summarize data that was sourced from underlying Enterprise Resource Planning applications. Each of the systems did comprise a number of underlying functional plans. These plans included strategic plans, operating plans, and in some cases engineering resource plans and product development plans contingent upon the firm's primary business model. Because they contained more detailed performance measure information—typically aligned to functional entities—they were deemed to be a subset of the reporting infrastructure. Further, their existence has been recognized in some cases as part of the system (Maisel, 2001; Bourne et al., 2002)

According to Franco-Santos et al. (2007), it is not expressly necessary to identify business objectives in order to have a performance measurement system, but some scholars—particularly those that link performance measures to comprehensive performance management frameworks—assert that before an effective system can be designed, organizational objectives must first be identified (Ittner et al., 2003; Kaplan and Norton, 1996c; Otley, 1999). In support of the latter view, objectives were present in all study firms, whether explicitly identified by informants or not. It was these objectives that appeared to orient the design of the performance measures and the systems themselves. Table 3-4 presents the primary objectives identified from the interviews. These objectives in turn were where the predominance of measures identified; this can be seen in Table 3-2. Franco-Santos et al. (2007) note that the feature of goals or objectives can be "problematic," especially in instances where there are only operational goals (Franco-Santos et al., 2007, p. 796). In the case companies, goals were both strategic and operational; for

purposes of this study, objectives are deemed an essential part of the strategic performance measurement system.

The final feature of interest was the presence of what can be dubbed a customer interaction component. This element of the strategic performance measurement system was resident in the sales function and consisted of a mechanism to maintain interaction with customers. In some cases—two in particular with Green Zone and Systemtron—the data was actually measurement data from product trials. In other instances it was a forum such as a customer council for Cybereye or a conference in the case of ZBA. In other firms it was an sales team that was meeting with customer regularly. Regardless of the form, in each of these cases the purpose of the mechanism was to gather feedback that provided insights, not just on current state demand needs, but future product features. These components presented in every case.

3.6.1.2. Roles

A review of performance measurement literature indicated that there are 17 separate roles a business performance measurement system can incorporate (Franco-Santos et al., 2007). The only required role the researchers note is "measure performance" (Franco-Santos, 2007, p. 797). Other roles performance measurement systems play are context-specific. In this study, the purpose of performance measurement is to evaluate strategic performance and enable decisions regarding the optimization of firm performance. To that end, there were six roles that could be considered common to the organizations and which are presented in Table 3-4:

1. *Manage Strategy*. The system provided information to the managers of the organization that helped them develop, evaluate, and monitor strategic performance. Strategic performance is performance related to the highest-order objectives or goals of the firm. As data were collected from the strategic performance measurement system, results were provided to decision-makers that were eventually used in helping determine if the strategy was working or was in need of change.

2. *Measure Performance*. Each firm's system consisted of a set of measures sufficient to facilitate the evaluation of strategic performance given that the performance measures consisted of individual measures that evaluated both operational and strategic performance.

3. *Manage Products*. A role of the system separate from individual measures was the monitoring of product roadmaps and the milestones within the roadmaps. Although not always part of the traditional measures, management of project activities and completion of scheduled updates is a form of quantification critical to the effectiveness of the system overall.

4. *Communicate Performance.* Data from the performance measurement system were collected and reported to top managers and other employees as a means of communicating performance. The reporting infrastructure present within each firm contributed significantly to the effective fulfilling of this role.

5. *Influence Behavior.* As measure information was evaluated, it was used to influence behavior. In some cases it was sales behavior, for example, focusing sales team's efforts on products and markets; in other cases, it was engineering time, for example, shifting developers' resources from one project to another.

6. *Adapt the Organization.* Ultimately, the information provided by the strategic performance measurement system was used to adapt the organization. Tactically, changes were made on an ongoing basis, but more significant changes were made as well such as the pursuit of a new market as was the case when Green Zone Networks focused on a new service provider.

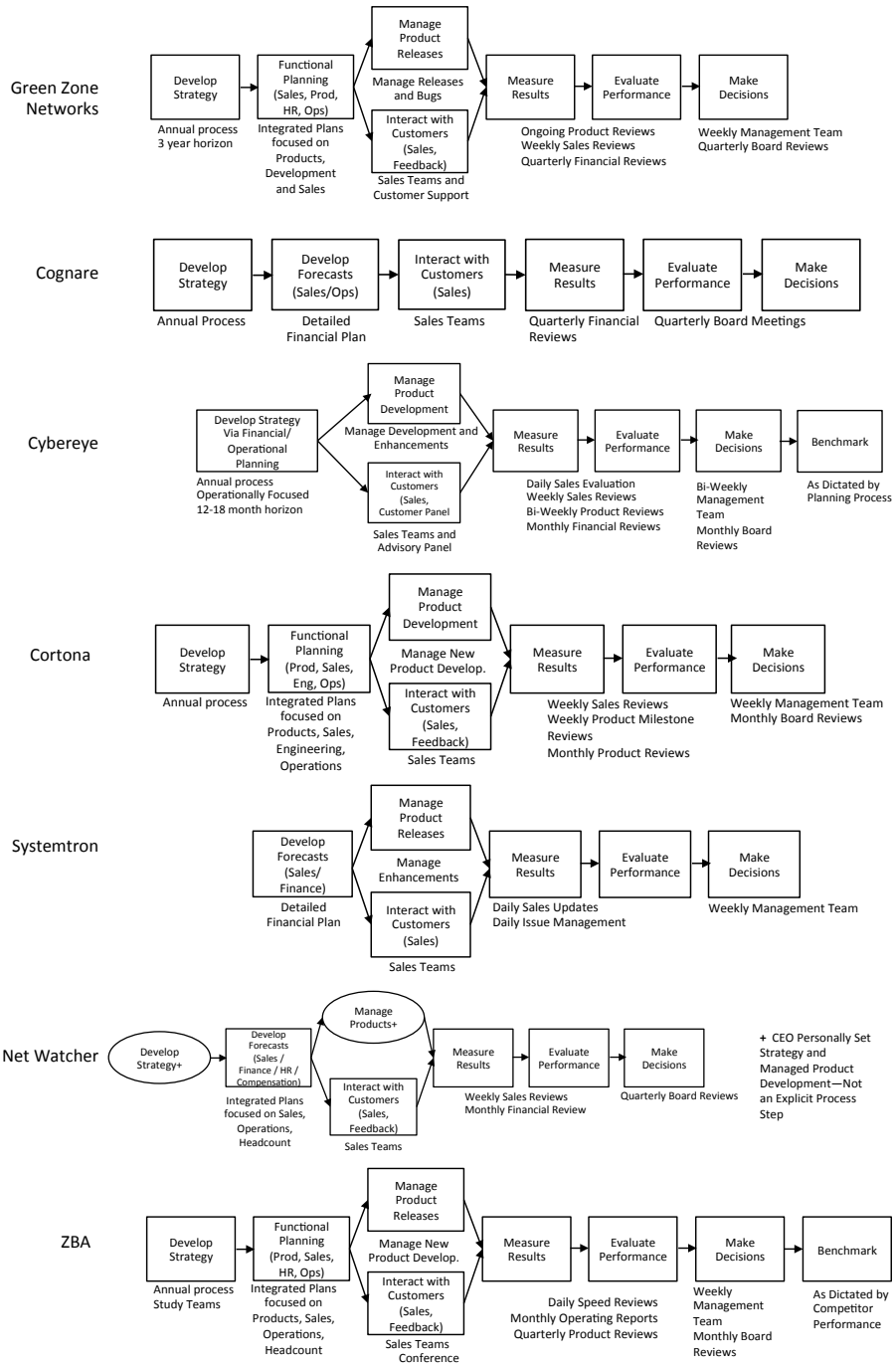
These six roles were all necessary to enable effective strategic performance measurement in this environment. However, it does appear that there are other roles that the system can capably play that contribute to its effectiveness as well as overall improvement in top team performance. These are discussed in Section 3.6.3 differences among the firm's strategic performance measurement systems.

3.6.2. Strategic Performance Measurement System Process Characteristics

The strategic performance measurement process comprises the series of steps and actions that together constitute the strategic performance measurement system. Strategy, or the concept of how the firm competes, is typically developed in a deliberate way, an emergent way, or some combination of both (Mintzberg and Waters, 1985). The analysis took account of these different perspectives by

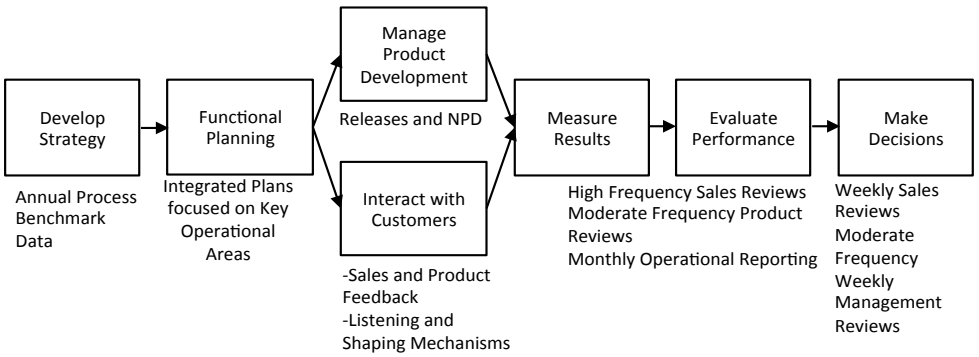
exploring how the study firms construct strategy in formal, intended ways and adapt strategy through both formal and informal activities. Each firm's strategic performance measurement process is shown in Figure 3-1.

Figure 3-1: Security Software Firms' Strategic Performance Measurement Processes



All study companies had a strategic performance measurement process linked to a broader strategic management process. The full process was carried out typically over the course of a year, although the specific timing of the process starts varied. ZBA started the process with study teams in the February-March timeframe followed by meetings in mid-summer. Green Zone Networks commenced in earnest in September. Nevertheless, there was sufficient commonality across the processes to identify a "generic" strategic performance measurement process, shown in Figure 3-2.

Figure 3-2: The Generic Strategic Performance Measurement Process of Security Software Study Firms



The principal stages of the strategic performance measurement process common to all were the following:

1. *Develop Strategy*. The starting point for the strategic performance measurement process was the development of the firm's strategy. This was an annual activity and in most cases was accomplished through the board of directors, top management, and department head participation from across the enterprise. The strategy development process most often comprised two distinct elements. First, leaders determined what the product development and release plan was for the upcoming year; new products and product enhancements would be determined at this time. The resources needed to support the product development and release strategy would be considered at this time as well. Second, the high-level financial targets would be specified during this stage. The top financial objectives for the organization would be identified at this time. The sales organization would

commonly provide input regarding the reasonableness of sales targets that would be incorporated into the overall strategy.

2. *Plan Functionally.* From the high-level product and financial strategies, detailed forecasts would be created. These forecasts specified revenue projections to a detailed level, identified the expense budget necessary to support the revenue plan to the department level, and in cases where there was a significant hardware element of the business, indicated the capital expenditures that would be needed to support operations. Budgets would be created for functional organizations where required. In some cases, preliminary product release plans and engineering support plans were identified at this time. Also, if a firm provided services only, discrete product development would be supplanted by developer time with the core services area.

3. *Manage Product Development.* With forecasts completed for revenue and expenses, product development and release plans were created. Because many of the firms were product based, these plans and this stage were a central aspect of the system. Product development and release plans—called product roadmaps—outlined development activities and project milestones that drove new product development and existing product enhancements. The publishing of product roadmaps effectively completed the objective development phase of strategic performance measurement.

4. *Interact with Customers.* As the firms provided their products and services to the market, representatives—sales professionals and at times engineers—interacted with customers. Interaction levels and frequency varied from firm to firm. Some simply provided products and serviced customers' accounts, while others focused on complaint handling or helping customers solve specific security or network challenges.

5. *Measure Results.* Companies periodically measured results in the main measure areas and with the specific measures highlighted in Table 3-2. Depending on the type of measure (e.g., revenue, customer, expense, product), data were collected daily, weekly, or monthly in most cases.

6. *Evaluate Performance.* Sales or revenue reviews were held with high frequency—daily or weekly; product reviews were conducted at regular

intervals—monthly or quarterly; operational reviews of financial information, including expense data, were scheduled most often monthly, but in some cases quarterly. Although the information needs and styles of leaders drove performance evaluation, high frequency of review, especially in the area of sales, was the standard.

7. *Make Decisions.* Related and subsequent to evaluation of performance, leaders made decisions regarding firm strategy. Particulars regarding how the system informed decisions are analyzed in Section 3.8.

The strategic performance measurement process was not carried out evenly with a similar amount of time on each step. The initial steps of developing strategy, functional forecasting, and developing product plans generally required two to four months; the balance of the annual process was spent iterating through the remaining stages and even occasionally revisiting the initial formulations as necessary.

3.6.3. Differences Among Strategic Performance Measurement Systems

Across the study firms, there were notable differences in the features, roles and processes of their strategic performance measurement systems. Two major differences were observed among system features,

1. *Depth of functional planning.* Although every organization developed functional plans, some did so to a much deeper level than others. Cognare developed an annual forecast and financial plan, but these were largely at a high level and used mostly with the top team. Cortona conversely saw their performance measurement system as supporting a compilation of their product roadmaps, their engineering plan, their revenue plan, and their overall forecast. At ZBA, they continued to make more granular dashboards to better track performance on an increasingly detailed level. The functional plan at Green Zone Networks was related to their strategic plan. The management team's interest and need for information was largely the driver of functional planning depth.

2. *Sophistication of reporting system.* The sophistication of the reporting system varied with the needs of the top management team as well. Cybereye and several other organizations use salesforce.com, a software

application that enables the creation of detailed dashboards virtually anywhere. As managers sought real-time information or wanted to disaggregate information, they often looked to their reporting tool to provide this. Others did not see the need for it.

In terms of role differences, there were two;

1. *Benchmarking.* A common use for strategic performance measurement systems is benchmarking, but not all firms did this. As part of their process, Cybereye and ZBA both benchmarked competitive performance.

2. *Signal Detection.* Each firm's' strategic performance measurement system interacted with customers at some level. However, a few firms, such as Net Watcher and Green Zone Networks, viewed their strategic performance measurement system as an important way of detecting signals from the marketplace. At a basic level, revenues and product sales were indicators was an indicator of purchasing behavior. But other, more useful or actionable predictors were linked to the elements that interacted with customers. At Green Zone, product trials provided not only insight into purchasing interest but also feedback regarding the needs of the customers. This was also the case at Net Watcher, which used information from their joint sales-engineering teams to stimulate product enhancements. Firms like Systemtron did interact with customers via trials, but leaders had no interest in actively collecting and analyzing customer input or incorporating it into product or feature discussions.

Two major process differences were found;

1. *Formality.* The formality of the strategic performance measurement system varied across the organizations. Cortona had a highly formal process with frequent regular meetings attended by the chief executive and selected board members. Cybereye, on the other hand, tended to hold informal conversations among top executives rather than formal performance review meetings. In some cases, Systemtron, for example, scheduled regular management meetings but cancelled them as top leaders attended other more pressing meetings like the sales meeting.

2. *Engagement level.* Like Green Zone Networks and Cortona, most firms had a highly participative strategic performance measurement system. Cortona had a very involved executive team. So did Systemtron, but with less focus on strategy development and more on performance evaluation. However, Net Watcher had a very low level of engagement; the chief executive crafted strategy himself and looked at financial performance, but the idea of a management meeting with broad participation seemed foreign to the chief financial officer. He noted that is was not something that would really be wanted or accepted by the chief executive.

3.6.4. Summary of Features, Processes, and Roles Findings

The features, roles and processes analyzed in the study and presented in Table 3-4 and Figures 3-1 and 3-2 confirm expectations in some areas but shed additional light on differences across the study firms.

First, the basic features of a business performance measurement system are present—measures and reporting infrastructure. However, the study firms also had strategic objectives, which strongly suggests that objectives are an essential element of the strategic performance measurement systems. Next, the roles clustered around six central ones: manage strategy, measure performance, manage products, communicate performance, influence behavior and adapt the organization. One other role emerged that appeared to be essential to the systems in some cases—detecting signals from the market. Signals were detected from the customer interaction component—which all firms' systems had but used differently. Finally, the processes across the firms were similar to such a degree that a common or generic system could be identified. However, the processes were not formalized to the same degree, nor was the level of engagement the same. Although the systems seemed generally more informal that formal, there was insufficient evidence to conclude that one level of formality was preferable to another.

3.7. Contextual Factors Affecting Strategic Performance Measurement Systems

The main goal of the third analysis was to develop an understanding of how contextual factors, both internal and external, affect strategic performance measurement systems. The *American Heritage Dictionary* (1985) defines context as "the circumstances in which a particular event occurs." They define factor as "one

that actively contributes to an accomplishment, result or process." The analysis then was designed to understand the specific elements of the turbulent operating environment that affect the design of the strategic performance measurement system. The way the firms' systems were used will be discussed in Section 3.8.

To accomplish this analysis, the case and interview data were again examined for comments or summaries that indicated an internal or external variable that influenced the design of the system. For each case, a preliminary set of variables was extracted that included factors such as management aims, board of directors, and technology change. From case to case, variables were compared to case data and refined or augmented as appropriate. After review of all the cases, the variables were synthesized into a summary set divided between internal and external factors. Specific quotes were identified in the interviews that illustrated these factors and organized by study organization. The internal and external factors supported by illustrative comments are presented in Table 3-5.

Table 3-5: Environmental Factors Affecting Strategic Performance Measurement Systems

Firm	Internal	Illustration	External	Illustration
Green Zone		"The process [strategy development] was driven by the senior management team, which was led by the CEO, the Worldwide Sales Leader, the Marketing VP, the Product Management VP, the Engineering VP the VP of Operations and myself, the CFO."	Technology Changes	"The other leg of the triangle was Product Management. They'd come to the [strategic planning] meeting and way, 'Well here's what we think', again this was still emerging technology, the markets for this were emergine, product management would come and say, 'well here's waht we think the market wants to buy."
	Top Management Aims	"So sales meetings were held every Monday and I went to those, the CEO went to those, the head of marketing went to those, the head of sales, and the head of operations. We actually used to have a management meeting—we would do in a different room and have a management meeting, and then we'd go down to the hall and have a sales meeting. And then we kind of changed it so that we would all go to the sales meeting on Monday to figure out what was going on and then the management meeting would be on Friday or later in the week."		"And there was this type of network secruity called Intrustion Protection (IPS). And the Network Behavioral Analysis (NBA) thing was kind of at the periphery of IPS. The IPS market was very big. And a lot of our customers were saying, "It's great you have NBA for peakflow X. The product is great. But we're not seeing thie IPS featrues in it we'd like to see.' And so we went and looked for an IPS, a small acquisition."
			Customer Requirements	
	Board of Director Aims	"The new money guys came in and said, 'Is that enough?' And we went into a different market. That was in the middle of 2002 and at that point the engineering guys started mocking up the Peakflow X product."		'You know the sales guy and the sales engineer takes on lead engineers from R&D and have this meeting with the engineers and a customer. They get a table up on the whiteboard and say, 'This is what we're looking for.' I'm not sure a formal customer satisfaction survey really will pick that up."
	Top Management Aims	"Again, we were a growth company, we're not being asked by our investors to product profits. We're being asked to produce growth. So looking at the P&L and the bottom line, weren't necessarily where we focused."		
	Company Culture	"And that always felt like a big chore for Arbor a little company to be running two separated product lines. We continued to do it because we felt strategically we needed to be in two places to give ourselves more market opportunity and I also think internally the technologists really wanted to build this other thing."		
		"The fear was that we were going to dilute the core product, the Blaster2 product. But the entrepreneurial, growth minded spirit took over and said, 'Well, that's just a risk we're going to have to take.'"		
Cognare	Business Model Choices	"I'd like to say that we are in these three businesses with separate strategies for the three businesses based on pure logic and reason—thoughtful analysis of each of these markets. But I don't think we really do that. I think we're a whole lot more opportunistic. We look for applications of our technology in places where we think there may be some opportunity to apply what we're good at."		
	Top Management Aims	"A decision is made [by the CEO] based upon the basis that prosperity is right around the corner. There are new, the CEO will argue, licensees out there. And they need us to defend. And the numbers are just screaming this doesn't make sense. The qualitative arguments are starting to get weaker and weaker."		
	Board of Director Aims	"Ultimately any big decisions get made by the CEO and Chairman. Whenever decisions get made, they are made before the board was ever assembled. The board meeting is just a formality."		
Cybereye	Top Management Aims	"No we don't really have strategy meetings as such. We don't do like a five-year plan process that kind of thing. The market changes dramatically. That's a style that doesn't exist here. We don't have a planning meeting."	Customer Requirements	"AOL was one of our first customers. And we developed what we thought was something that we thought was good to be used by the ISP marketplace in conjunction with AOL. When we got to the bottom what we found was it was somewhat specific to AOL and it really wasn't applicable to the rest of the industry of the OEM marketplace." "Plus, we have developed in the last year or so... it's a customer advisory council. We talk about those things and we allow them to come back and say, 'Hey, how about this?' This is a mix of companies and industries and we keep it to a small number. It's ten to twelve customers. We might do this twice a year. The last one was very good I would say. Good ideas but not everything is something we're going to do but at least there are ideas that come out of it and we can look at and consider."
	Board of Director Aims	"Coming into this year—and this was kind of from the board down—we said we've got to focus. We know what we've been successful at so let's focus on that and grow from there as opposed to adding new product that are on the fringes of what we do."		

Firm	Internal	Illustration	External	Illustration
Systemtron		"Every week we have a war room that convenes where we talk about everything. Its senior executives, sales leads in from around the world, product marketing, and management guys, the technical assistance center, everyone that has a customer touch will be there. This is a virtual war room, what issues are on the table, what customer problems you are having, you can throw anything into the mix."		
	Top Management Aims	"Most of the war room items are around the customer. But the reason we stay so close to this tactical information is to try and spot the problems before they become really large. Ultimately every response is reactive. We do react to information, we can't forsee the error of our forecast until we have some data to measure it. So we react to information as it comes in. What we try to do is identify trends as early as we can."		
	Board of Director Aims	"Most of the war room items are around the customer. But the reason we stay so close to this tactical information is to try and spot the problems before they become really large. Ultimately every response is reactive. We do react to information, we can't forsee the error of our forecast until we have some data to measure it. So we react to information as it comes in. What we try to do is identify trends as early as we can."		
Net Watcher	Top Management Aims	"...this is an engineering run company because our CEO is the chief engineer and inventor so ultimately it gets to him. And he will pick among them and say, "Okay, not it's time to add voice recognition, voice packet recognition to the product and we'll put it in the product and then he'll evangelize it with these customers often personally."		"To do that we have a strategy where we will do the best we can to maintain technology leadership of this technical mechanism of staying close to customers in finding out what the marketplace needs next and to go do that before the next guy does so that we maintain a leadership position and create barriers to switching."
	Culture	"This was the CEO's idea. There was great skepticism in the company. He said, 'I think we can do this and it makes sense.' We all said, 'This makes sense.' I speak for most people and some who wouldn't say to him that it won't happen. The private equity firm, we didn't know how big they were, what was going on with them and the target because they were private. Financial performance was abysmal.... So it seemed as if it was a long shot, very remote possibility. So no one else, except for an occasional discussion internally where our CEO would say privately, usually one on one, this would be a great thing. So he did it unilaterally. Had it been up to a vote of the management team, I think the management team would have said, 'It's extremely unlikely and we shouldn't be wasting time trying. But her persisted and that prevailed. He did it by himself."	Customer Requirements	"Dealing with our technical sales force that means the systems engineering people that the salesman, who are in with customers, customer technologists, the engineers, not the CEO, the network engineers saying, 'What is it that you're doing? Here's how our product works. Here's how you can use it. Look at the value you get.' And the reaction by the customer is, 'But it doesn't solve this problem. You don't have recognition of voice traffic in your product. You don't have voice recognition of voice traffic in your product and we're just about to roll out voice and I'm nervous because I don't have any way to manage that.' So without going into the technology story, we take that a comeback in the systems engineers who are sort of our early warning system here, comeback and said, 'We're starting to hear about voice. We need to do something about voice.' So they come back and talk to our product management staff in engineering, they will talk to the head of engineering who is basically an internal engineer and then if they feel really passionately about it, they will go talk to—maybe through the management chain—to our CEO. This is usually individual. This is not organized... basically when things really need to happen an individual with a customer calls up and says, 'You got to understand this, we need to put this into the product and here's why. And if we put this in the product, here's what I think the customer will do and here's what I think is applicable to a whole bunch of other customers some of which are mine, many of which are not."
ZBA		"Art [CEO] got a little bored with it. I think he got bored with scored performance."	Technology Changes	"Yes. Overall yes [the industry is fast moving]. I think the security segment of the industry is a little bit slower. Security people are a little bit more conservative and consequently things happen a little bit slower than they would in the networking business. It's getting more organized. If you take Art's keynote speech at that last RSA conference, security will be absorbed into infrastructure companies at some point... larger players are acquiring smaller players in larger players are more organized."
	Culture	"When I left there was a strategy map build for the company and for the key business units in the company. They were cascaded and there were targets and metrics and there was an inventory of activities that represented a plan and there was a clear identification of where the gaps were. This is what we think we need to do to make our plan and these things aren't funded by the front part. So that's the state when I left the company. When Art says to you that he stopped it probably means in this cycle last fall at least the plans for the year sounds like they've abandoned and gone back to the way it was before we started."		"So then there are real issues with customers. Customer needs this. They want your product but they have a request for a certain feature that has to go into the roadmap. Then we have to look at everything and say, "Okay, if we do this for this customer, how will that ripple back into all our commitments that we've got?" Delivery commitments, resource commitments, budget constraints etc. in order to meet those certain requirements. You've got a lot of troubleshooting that happens, something goes wrong out in the field with a product, people have to get involved, engineers have to get involved in, product managers have to get involved, so there is a certain amount of time spent doing escalations that happen out there in the field."
	Top Management Aims	"The problem with dashboards is it tends to be a relatively monolithic type of thing. I find, I find that the management by dashboard approach can be too rigid because we have a diversity of businesses and business models. We have some large business and some small businesses and new businesses we're investing it. And so, how do you look at a dashboard that captures all that? We look at product line P&Ls. We're looking at measure more like that. You know red, yellow, and green? I'm somewhat cynical about it because it's just too simple. It doesn't actually... I don't know whether it's red, yellow or green until I look at the detail."	Customer Requirements	"So, one of the things we realized was that in the consumer space, as we were studying, as we were trying to grow, one of the reasons we weren't growing was because we weren't doing that well in consumer markets. We were moving at a snail's pace. And Chris came to me and said, 'You know, not everyone wants tokens. They want risk based authentication.' Go study it."
Cortona	Top Management Aims	"I'll tell you what, our CEO was more involved that most that I find. And it was very, very helpful for us in the team to have him do that. We had our staff meetings every Monday, every week and we would updated in great detail bookings, quarter to date and year to date results and we would spend a lot of time on the product roadmaps."	Customer Requirements	"So we felt there was a igt need on the peering points of these carriers and also those on the subscribers of carriers that these things are going to be needed [product to support increased bandwidth]"
	Board of Director Aims	"We had a product meeting every month and we did a fairly detailed roll up of the finances of those board meetings. So that was unusual. I've been at a lot of start-ups and having face-to-face board meetings monthly, that's unheard of. I think it was effective."		

3.7.1. Common Factors Among Security Software Firms

More internal factors affect the design of the strategic performance measurement system than external factors. In the study firms, four distinct factors—three internal and one external—were found to affect the design of the system.

1. *Top Management Aims*. The most common and strongest factor was the aims of top management. Each study firm showed evidence of strong and direct management influence on the strategic performance measurement system. At Cognare, the chief executive was described as disconnected from the realities of business performance—at times looking past performance data that provided strong evidence of a flaw in their product offerings—to other more, "qualitative" factors. Cognare's strategic performance measurement system was perhaps the least developed of all the study organizations. At ZBA, the chief operating officer created and deployed a Balanced Scorecard and the chief strategy officer built strategy maps, both of which were abandoned when the chief executive became "bored" with them. At Cortona, the chief executive was keenly interested in product development; and accordingly, executive team meetings spent, "a lot of time on product roadmaps." Given that top managers are typically the architects of the system, their prevailing or perceived information needs not surprisingly drove the construction of the system.

2. *Board of Director Aims.* In at least two organizations, the board of directors was staffed with venture capitalists or private equity representatives who strongly influenced not only the direction, but also the focus, of the strategic performance measurement system. Two different organizations invested in Green Zone Networks, and they emphasized revenue growth as well as new product exploration. Systemtron was taken private by a firm that gave them dramatically high revenue targets; Systemtron managers monitored them daily and the chief financial officer closely watched stringent spending limits. At Cybereye, the board felt the company needed to focus on a core set of products, and it became the emphasis of reporting and management.

3. *Culture.* Culture was another common factor—common but not present in all organizations. In firms with a strong entrepreneurial spirit, there was an eagerness to explore almost any kind of new product and product enhancement. This was the case at Green Zone Networks. At Net Watcher and ZBA, there was reticence to engage in certain types of behaviors, such as "red, yellow, and green scoring" and holding formal meetings or strategy sessions. These firms had strategic performance measurement systems that reflected these cultural inclinations.

4. *Customer Requirements.* Linking back to the generic strategic performance measurement process, all firms had a customer interaction element. In many cases, information garnered from customers and their needs drove both strategic and product choices. Cortona created a new product, the R11, specifically based on a customer trend. This was the case at Green Zone Networks and Net Watcher as well. Customer requirements, through either formal or informal mechanisms, made their way to the top management team and were acted on. Because of their desire to listen and in some cases co-create with their customers, these firms set up structures to do so.

3.7.2. Differences Among Firm Factors

Only minor differences existed among the firms in terms of the specific factors. Two firms' strategic performance measurement systems were influenced by technology changes and one was affected by business-model choices. However, two firms, Cognare and Systemtron—arguably the poorest performing of all firms studied—presented no evidence of external factors influencing the design of the system. Whereas other firms were keenly linked to customer requirements—and actively engaged mechanisms established to monitor their evolutions—these two firms did not, despite the presence of the mechanism that would enable this within the strategic performance measurement system.

In the case of Systemtron, they had a sales force that provided trials. However, there was no evidence that the trial information was a source of meaningful data for top managers. In fact, the opposite was true.

> "We looked at the technology we had, we listened to our internal discussions about how good that technology was, and we said this is

> how we differentiate. And what we failed to do was look outside ourselves and say, 'Does anybody care?'"

The sense from the chief financial officer was that they were only concerned with managing what they had for products and "selling" a good story to customers to keep them on track for a rapid exit by the private equity firm. The problem was that it was not working.

At Cognare, customer and market data presented an inconvenient set of data that did not curtail the chief executive's search for the information to confirm his biases,

> "It's the qualitative elements [of performance] that get discussed [at the board meetings]. Increasingly, the numbers are just screaming, this doesn't make sense; the qualitative arguments are getting weaker and weaker."

The chief financial officer noted that even the most carefully constructed spreadsheets and comparisons of actual to forecast performance could not persuade the chief executive—and the board—to make the changes needed to improve business performance.

3.7.3. Summary of Contextual Factors

Four contextual factors--management aims, board of director aims, culture, and customer requirements—have strong effects on strategic performance measurement systems. Internal factors were the most prevalent—three of the four factors are driven by internal firm attributes. The most influential of them is management aims. Every study firm's strategic performance measurement system was significantly impacted by management's aims and their information needs. Board of director aims had a similar effect albeit enacted through management's actions. The influential external factor was customer requirements. In several cases, customer requirements and their changing needs drove the formation or evolution of the customer interaction element of the system. It is likely, however, that the need to understand customer requirements and use of mechanisms to do so were moderated by management's aim in designing the strategic performance measurement system.

3.8. Functioning of Strategic Performance Measurement Systems

The final aim of the study was to gain insights into how the strategic performance measurement system functioned. One of the main roles of a business performance measurement system—a strategic performance measurement system especially—is to manage strategy (Franco-Santos et al., 2007). Strategy management incorporates a variety of activities from formulating or planning strategy to ensuring execution of the strategy. As a system provides feedback, that information is communicated to top managers as input to decisions that are central to effective firm functioning. Therefore, in order to examine the functioning of the strategic performance measurement system, it was necessary to explore major strategic decisions made by each firm's top management team in order to determine how and to what degree the strategic performance measurement system facilitated the decisions.

3.8.1. Test of Strategic Performance Measurement Functioning: Strategic Decisions Influence

The decisions of interest were strategic decisions, arguably the most important decisions executives make (Drucker, 1966). A strategic decision is one that has the following characteristics: (1) it involves strategic positioning or redirection of the firm; (2) it has high stakes meaning outcomes which significantly enhance firm performance; (3) it involves as many functional areas of the firm as possible; (4) it is representative of major decisions made by the firm (Bourgeois and Eisenhardt, 1988). To explore how the strategic performance measurement system functioned in informing the decision, each executive interviewed was asked to identify three strategic decisions made by the top management team in the past three years. One case company was not able to provide any decisions and another could only identify two. These decisions are presented in Table 3-6.

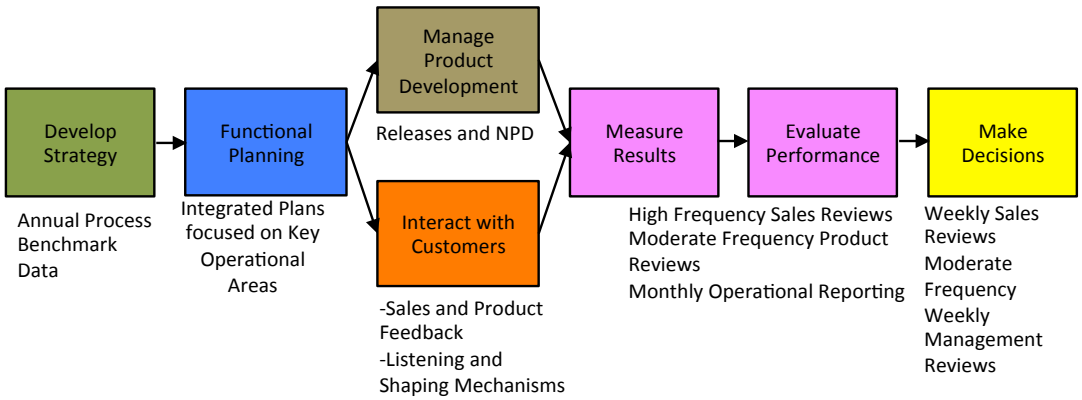
Table 3-6: Strategic Decisions Analyzed by Firm

Firm	Decision Name	Decision Description
Green Zone Networks	Blaster2	Develop a new product for a new market
	Government Entry	Enter the federal government market
	International Expansion	Open overseas locations to access new markets
Cognare	Business Model Change	Sell a major portion of the business
	Test Equipment Entry	Develop a new product for a new market
	Software Services Entry	Develop a new service for a new market
Cybereye	Pursue Original Equipment Manufacturer Market	Partner with original equipment manufacturers
	Focus Product Set	Narrow the focus of the product portfolio
	International Market Entry	Open overseas locations to access new markets
Cortona	Develop the R11	Develop a new product to meet expanding customer needs
	Original Equipment Manufacturer Sales Strategy	Partner with original equipment manufacturers
	Outsource Engineering	Move engineering resources overseas
Systemtron	No Decisions	
Net Watcher	Acquire largest competitor	Decision to consolidate industry
	Enter wireless space	Decision to enter a new market
	Enter the specialty network storage market	Decision to enter a new market
ZBA	Enter the consumer market	Decision to enter the consumer security market
	Accelerate the "Security Everywhere" project	Research to make mobile devices secure.

Once the decisions were identified, the informant was asked to describe the process of how each decision was made starting from the point when the need for the decision was triggered through post- implementation evaluation. Narratives of each decision were created from the interview transcripts that are embedded in the cases; then each decision was extracted by name and the major elements of each decision were identified: type of decision, complexity of decision, decision speed, outcome, and satisfaction level. These elements were provided in each case by the interviewees. The firm's primary business objectives and primary contextual factor affecting the firm's strategic performance measurement were linked to each decision. Finally, the flow of the decision was traced through the major stages of the

generic strategic performance measurement system, using a color-coding scheme as shown in Figure 3-3.

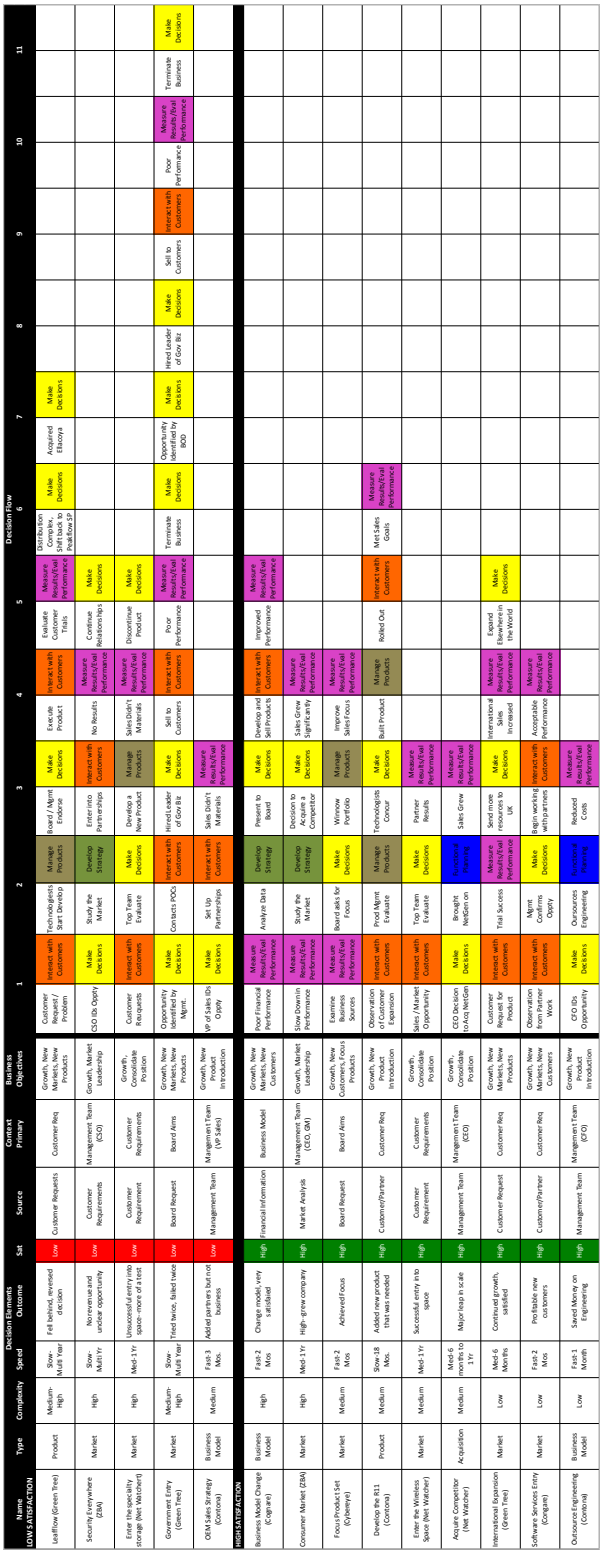
Figure 3-3: Generic Strategic Performance Measurement Process



Next, patterns were sought within and across firms for individual decisions and then for the set of decisions in total. Decisions were grouped by level of complexity, decision speed, and then level of satisfaction. This made it possible to visually inspect the decision-activation process, meaning, and how the decision activated different parts of the strategic performance measurement through its functioning cycle.

Examination of decisions at individual firms and by level of complexity did not reveal patterns. Examination by decision speed was not fruitful either. A modest pattern emerged decisions were examined by level of satisfaction. The display of decision activation by satisfaction level is shown in Figure 3-4.

Figure 3-4: Activation Decision



Name	Type	Complexity	Speed	Decision Elements Outcome	Sat	Source	Context Primary	Business Objectives	Decision Flow 1	2	3	4	5	6	7	8	9	10	11
LOW SATISFACTION																			
Leaflow (Green Tree)	Product	Medium-High	Slow-Multi Year	Fell behind, reversed decision	Low	Customer Requests	Customer Req	Growth, New Markets, New Products	Customer Requests / Problem	Technologists Start Develop	Board / Mgmt Endorse	Execute Product	Evaluate Customer Trials	Distribution Complex, Shift back to Peak Pow SP	Acquired Eliacyra	Make Decisions				
Security Everywhere (Zeki)	Market	High	Slow-Multi Yr	No revenue and unclear opportunity	Low	Customer Requirements	Management Team (CEO)	Growth, Market Leadership	CEO IDs Oppty	Study the Market	Enter into Partnerships	No Results	Continue Relationships							
Enter the specialty storage (Net Watcher)	Market	High	Med-1 Yr	Unsuccessful entry into space - more of a exit	Low	Customer Requirement	Customer Requirements	Growth, Consolidate Position	Customer Requests	Top Team Evaluate	Develop a New Product	Sales Didn't Materials	Discontinue Product							
Government Entry (Green Tree)	Market	Medium-High	Slow-Med Year	Tried twice, failed twice	Low	Board Request	Board Aims	Growth, New Markets, New Products	Opportunity Identified by Mgmt.	Contacts POCs	Hired Leader of Go to	Sales Didn't Materials	Poor Performance	Terminate Business	Opportunity Identified by BOD	Make Decisions				
OEM Sales Strategy (Contoso)	Business Model	Medium	Fast-3 Mos.	Added partners but not business	Low	Management Team	Mangement Team (VP Sales)	Growth, New Product Introduction	1/2 of Sales IDs Oppty	Set Up Partnerships	Sales Didn't Materials	Sell to Customers								
HIGH SATISFACTION																				
Business Model Change (Cogniare)	Business Model	High	Fast-2 Mos	Change model, very satisfied	High	Financial Information	Business Model	Growth, New Markets, New Customers	Poor Financial Performance	Analyze Data	Present to Board	Develop and Sell Products	Improved Performance		Measure Results/Eval Performance					
Consumer Market (ZBA)	Market	High	Med-1 Yr	High- grow company	High	Market Analysis	Management Team (CEO, GM)	Growth, Market Leadership	Slow Down in Performance	Study the Market	Decision to Acquire a Competitor	Sales Grew Significantly								
Focus Product Set (Fysenyo)	Market	Medium	Fast-2 Mos	Achieved Focus	High	Board Request	Board Aims	Growth, New Customers, Focus Products	Examine Business Sources	Board asks for Focus	Winnow Portfolio	Improve Sales Focus								
Develop Pir R11 (Contoso)	Product	Medium	Slow-18 Mos.	Added new product, that was needed	High	Customer/Partner	Customer Req	Growth, New Product Introduction	Observation of Customer Expansion	Prod Mgmt Evaluate	Technologists Concur	Built Product	Rolled Out	Mid-Sales Goals	Measure Results/Eval Performance					
Enter the Wireless Space (Net Watcher)	Market	Medium	Med-1 Yr	Successful entry into space	High	Customer Requirement	Customer Requirements	Growth, Consolidate Position	Sales / Market Opportunity	Top Team Evaluate	Partner Results									
Acquire Competitor (Net Watcher)	Acquisition	Medium	Med-6 mos to 1 Yr	Major leap in scale	High	Management Team	Mangement Team (CEO)	Growth, Consolidate Position	CEO Decision to Acq NetGen	Brought NetGen on	Sales Grew									
International Expansion (Green Tree)	Market	Low	Med-6 Months	Continued growth, satisfied	High	Customer Request	Customer Req	Growth, New Markets, New Products	Customer Requests for Product	Trial Success	Send more resources to UK	International Sales increased	Expand Efforts in the World							
Software Services Entry (Cogniare)	Market	Low	Fast-2 Mos	Profitable new customers	High	Customer/Partner	Customer Req	Growth, New Markets, New Customers	Observation from Partner Work	Mgmt Confirms Oppty	Begin working with partners	Acceptable Performance								
Outsource Engineering (Contoso)	Business Model	Low	Fast-1 Month	Saved Money on Engineering	High	Management Team	Mangement Team (CFO)	Growth, New Product Introduction	CFO IDs Opportunity	Outsources Engineering	Reduced Costs									

3.8.2. Findings from Strategic Performance Measurement System Decision Activation Analysis

In general, decisions that required more steps and more time within the construct of the strategic performance measurement cycle were related to lower satisfaction levels. There is a possibility of this a being firm-specific phenomena, but there are firms that are fast decision makers—like Net Watcher—that had decisions in both low- and-high satisfaction categories. Also, where there are more decisions being made through the overall process, lower satisfaction is present. This could potentially indicate data insufficiency supporting the decision. That said, fewer steps were generally related to higher satisfaction levels. These findings in aggregate are consistent with the proposition that greater decision speed leads to greater decision effectiveness in high-velocity settings (Eisenhardt, 1989b).

What the findings show is the use of the strategic performance measurement system more often throughout the activation process and, in particular, closer to the start of the process. In six of eight decisions, information from the system led to responses that engaged the firms in further analysis or action that was directly based on that information. In the case of ZBA, their decision to enter the consumer market—a market the chief executive had been reluctant to enter—was based directly on performance that was falling below revenue plan to such a degree that firm leaders could not understand the variance. The decision flowed from a slowdown in the core business that was immediately detected by an unexplainable variance in forecasted performance. As the chief executive noted,

> "We hit a wall from a growth standpoint. We got totally knocked off our operating plan. Market conditions just stalled on us. To this day I'm not sure exactly why."

This triggered a response from the quantitative financial information linked to the firm objective of growth. The response was effectively a search.

> "We were trying to grow and one of the reasons we weren't growing was because we weren't doing that well in consumer markets. We were moving at a snails pace."

This led to a study of the customer's needs in the market that before they had neglected. The chief executive admitted they had fallen behind, but it was not until they began to look into the problem that they could understand why or effectively start the process of challenging some of the chief executive's basic assumptions.

> "The general manager came to me and said, 'Not everyone wants ringlets, I'm sorry. They want risk-based security.' And I said, 'No one wants good enough security. You're either secure or you're not.' The general manager said, 'I think you are wrong.' I said, fine… go study it."

After analyzing the market, they had enough information to make a decision around market entry, which was to acquire a competitor to access the market.

> "It took us five months to figure out what we wanted to do and we realized we were going to have to make an acquisition. So we reacted to facts and circumstances. It was a strategic necessity."

Basic performance information was gleaned from the strategic performance measurement system. But specific data to inform the decision came as the result of a focused search for decision specific data. Within a very short cycle—less than a year—the firm's system indicated a slowdown in performance, revenue performance, which they tracked on a daily basis. This early indication led to a search that in turn precipitated an acquisition, entry into the market, and determination of success shortly after the combination. This cycle of performance evaluation, decision data gathering, analysis, and interpretation, followed by decision and action was seen in other high-satisfaction decisions. Cognare's decision to move into the chip market had the same decision flow.

The low-satisfaction decisions often started with hypothesizing about ways to improve strategic position that were not directly informed by the system. The decision by Green Zone Networks to enter the government market is probably the best example of this. The board of directors, who had the primary objective of growth, concluded that the company needed to have a presence in the federal government. Reeling from the September 11th attacks on the World Trade Center in New York, the directors felt there must be a major opportunity in the government.

> "So of course, everybody at the board level said we're a security company, we have to be in the government. Homeland security and everything. Just a gut reaction from everyone. Okay, Rajiv [company founder] has some connections in the government let's to try and it. So we went and hired a guy and we started to sell a few things in the government. It was mostly pilots. This was in 2001. We almost hired this guy right away. As soon as we had the idea, we hired the guy. Maybe a couple of months."

As the chief financial officer noted, the trigger was director gut reaction—not a response to any specific mechanism or element of the strategic performance measurement system. The management team met the board's request and hired a person to help access the government market. There was some initial success but it was in areas not immediately related to their core products or services.

> "So we got into the government business and we hired a guy and what we found was that the government likes to buy pilots. They like to buy one. So the promise of government business is that they are going to buy 500 of your units. The Navy is going to put this on every ship. The Air Force is going to have one on every Air Force base. But what happens is they buy one and test the heck out of it for a long time. So we had some early success, but they were one-zies or two-zies. And we were like, 'Oh, man, what's going on here?' And our guy in the government space, he wanted to build an army. 'I need an office administrator. I need some people on the street. I need a contract person.' And he wanted to go off and build an army. These early pilots didn't turn into any production sales, so we ended up letting him go."

But this did not satisfy the board's appetite for accessing the government space. Despite the poor performance, the board persisted.

> "And the board said, 'What are you doing about your government approach? You can't just let it go.' So we went and hired another guy. Another year went by and we didn't do anything in the period. There was one big government sale that we made between the first sales guy and the second sales guy, but it turned out they didn't want what we sold. It was a service…. a one-zie. The venture capital guy's idea was that we are

> a security company and there's all this opportunity in the government space so we've got to be there."

But the management team, despite the directors' urgings eventually realized—after two attempts—that the government market was indeed a different kind of business, one they were not equipped to access.

> "As a management team they kind of came to the conclusion that this whole thing is about cycles. It became kind of obvious. The first guy was right; we did need four or five people. The impression we were left with was we didn't put enough resources into it [the government market]; we didn't have the timing right because of the buying cycles, and the final thing was that companies like us that had success in this market that was all they did."

So the managers realized that they did not have either the bona fide interest or skill to enter the market successfully. And the satisfaction level with the decision reflected it appropriately.

> "I have to call this one very unsatisfied. We took two bites at the apple and it was rotten both times."

In this example, decision activation—although informed during the system functioning cycle by data such as performance to plan—was not triggered by information from the strategic performance measurement system.

3.8.3. Summary of Strategic Performance Measurement System Functioning

In the analysis, the main finding identified by tracing strategic decisions through their lifecycle as they related to strategic performance measurement system activation was that higher decision satisfaction levels are linked to an early use of the system in the decision process. In lower-satisfaction decisions, the system is used later in the process and is not expressly used as a trigger for strategic decisions. In all cases, any decisions will be moderated by the management team's ability to use information in a way that facilitates an effective decision-making process, which may or may not be linked to the strategic performance measurement system.

3.9. Toward A Model of Strategic Performance Measurement In Turbulent Environments

The purpose of this study was to gain an understanding of how firms operating in turbulent environments measure strategic performance. The features, processes, and roles of strategic performance measurement systems examined were presented in Section 3.6. This section addresses three primary aims set out at the start of the study. First, the four questions raised at the outset of the study are addressed using support from the research. Second, set of propositions is developed from each question's answer that elevates the analysis to a higher level of abstraction. Third, a model is proposed that can be used to guide the development of strategic performance measurement systems for firms operating in turbulent environments.

3.9.1. Recapitulating the Effects of Turbulence on Firms

In stable environments, firms can design performance measurement systems with relative ease. The number of variables on which they must focus are few; the relationships among those variables are established; the pace of change is slow, incremental, and predictable in nature; and management—with modest effort—has the ability to maintain focus on the narrow set of environmental variables linked to firm performance. The performance measurement system can be widely cast, incorporate high levels of detail, and be monitored with little frequency due to the likelihood that little will change over relatively long periods of time.

This is not the case in conditions of turbulence. As turbulence increases, the number of variables on which the firm must focus grows; the relationship among the variables becomes obscure; and the pace of change grows more rapid, discontinuous, and unpredictable in nature, pressing even the best managers to understand—let alone monitor—the critical variables that impact the achievement of high levels of firm performance. The performance measurement system must accommodate these conditions in a way that provides top management the information they need, at the soonest possible time, from what may be relatively weak signals in the environment. A system that can accomplish this does not look like the traditional performance measurement systems being employed in practice today.

3.9.2. Question 1: What Strategic Performance Measures Are Used by Firms in Turbulent Settings?

The evidence from this study indicates that firms use a concentrated set of performance measures to manage their strategies. Strategic measures are not used explicitly; what is employed is a focused set of measures targeted around critical areas of performance. The critical areas of performance identified were revenue growth, customer engagement, and expense management. However, within these critical performance areas, firms measured performance with a high degree of component detail and considerable depth. Revenue, as an example, was decomposed into revenue by product, region, and sales team along with whatever level of detail was necessary to maintain a pulse on the flow of business. Predictive indicators for revenue were identified as well, such as bookings and order flow linked to activity measures around customer engagement with product trials. Performance measure information that provided managers with timely insights into the most important areas of performance is what was considered strategic in nature. Thus, the response to turbulence was a set of performance measures, focused on critical performance areas that were comprised of a greater number of subordinate measures that were biased toward the capture of real-time data.

This finding is consistent with some areas of literature but conflicts with others. The findings did not support the claim that to be effective, strategic performance measures and their systems need to be balanced. In fact, the strategic performance measures used by study firms were not balanced at all; they clustered around a narrow set of critical performance variables specified by top managers. Measures were largely financially oriented, with some non-financial measures in the mix, such as customer-activity measures and selected key project indicators as examples. Kaplan and Norton (1992) claim that a Balanced Scorecard is an effective way to provide managers with a comprehensive view of performance across an organizational system. However, no firm in the study sought to create a comprehensive view of performance, and their strategic performance measures reflected this. What they did expressly seek was timely insight at the highest level of detail possible in areas that were deemed critical to performance. This finding was consistent with Eisenhardt's (1989b) proposition that greater use of real-time data enhances firm decision speed and effectiveness. It is also supported by information-processing views which propose that as task uncertainty increases, more information must be processed by decision-makers during execution to achieve a given

performance level (Galbraith, 1973). Given these findings, the following propositions are offered,

> Proposition 1: In turbulent environments, strategic performance measures will be clustered on critical environmental variables.

and,

> Proposition 2: In turbulent environments, strategic performance measures will be present in greater number in critical environmental variable areas.

3.9.3. Question 2: What Features, Roles, and Processes Comprise Strategic Performance Measurement Systems for Firms in Turbulent Settings?

The evidence from this study was consistent across firms regarding the features, roles, and processes that comprise a strategic performance measurement system for firms operating in turbulent settings.

The study firms had three main features common to all: performance measures, a reporting infrastructure, and a set of objectives. The objectives were not always explicitly stated; however, management's primary aims were manifest in the set of performance measures examined, which characteristically aligned with firm objectives.

In terms of roles, the study firms exhibited six central ones: manage strategy, measure performance, manage products, communicate performance, influence behavior, and adapt the organization. One other role emerged that appeared to be essential to systems in some cases—detecting signals from the market. While it was not employed in all cases, the mechanism to detect signals—the customer interaction component—was.

From a process standpoint, considerable consistency was identified across the study firms in terms of a strategic performance measurement process. Seven common stages were identified that enabled the creation of a generic strategic performance measurement process reflective of all firms in the study: develop strategy, plan functionally, manage product development, interact with customers, measures results, evaluate performance, and make-decisions.

These findings are supported by views from the literature but offer some refinement. The features found support the claim by Franco-Santos and others (2007) that there are two required features: measures and a reporting infrastructure. But the findings also support the addition of objectives as a feature, which all systems had. Objectives—set by firm management—serve as the basis for strategic performance measure design, so it would be expected they would be a feature of a strategic performance measurement system in this context. Further, the objectives around which measures are designed are those which top management pays attention to; these in turn need to be aligned with critical environmental objectives in order to be effective maintaining fit between the firm and the changing business setting.

Franco–Santo's et al (2007) also note that there are five different categories of roles a business performance measurement system plans: measure performance, manage strategy, communication, influence behavior and learning and improvement. In this study, all were presents, however, the additional role of detect signals was found to be present in six of the seven firms.

Finally, this research is consistent with Franco-Santos et al's (2007) findings that a business performance measurement system has five process categories: select and design measures, collect and manipulate data, information management, performance evaluation and rewards and system review. While the measurement processes highlighted include other process stages, many of these would likely be categorized as performance management rather than narrowly defined as performance measurement.

Given these findings, the following proposition is provided,

> Proposition 3: In turbulent environments, strategic objectives will aligned to critical environmental variables.

3.9.4. Question 3: What Contextual Factors Affect the Design of Strategic Performance Measurement Systems in Turbulent Settings?

This inquiry found that four contextual factors influenced the design of a strategic performance measurement system: management aims, board of director aims, culture, and customer requirements. In the study firms, each of these had strong effects on strategic performance measurement systems. As discussed previously,

internal factors had the greatest impact on the design of the system—management aims in particular. The most influential external factor was the ongoing need to routinely capture and evaluate customer requirements.

What was shown in the research was that the strategic performance measurement system was most strongly influenced by management's aims. In instances where management was attuned to a particular environmental variable, such as customer behavior or customer feedback, the system was designed to monitor this critical variable. This finding is supported by published literature, in particular Simons (1991) claim that managers design selected control systems, such as profit-planning systems and intelligence systems, to interactively evaluate areas of interest. It is this interactive element of the strategic performance measurement system that enables the successful management of uncertainty. Given these findings, the following proposition is offered,

> Proposition 4: In turbulent environments, the focus of management's attention will be the primary factor affecting the orientation of the strategic performance measurement system.

3.9.5. Question 4: How Does a Strategic Performance Measurement System Inform Strategic Decisions in Turbulent Settings?

The findings from this study show how strategic performance measurement systems inform strategic decisions; however, the process and the satisfaction with the information vary depending on how the strategic performance measurement system is used. In the analysis that examined how strategic decisions activated different elements of the strategic performance measurement system, the research showed that higher decision satisfaction levels are linked to an early use of the system in the decision process. Further, the extent to which performance information from the strategic performance measurement system flows directly to decision-makers enabling search which informs their decision-making appears to lead to higher decision satisfaction. Conversely, in lower-satisfaction decisions, the strategic performance measurement is used later in the process and is not expressly used as a trigger for strategic decisions. Regardless of strategic performance measurement system use, any strategic decision made by management will be moderated by the management team's ability to interpret information—whether from the strategic performance measurement system or not—in a way that facilitates an effective decision-making process. The use of the strategic performance measurement

process is supported by Bourgeois and Eisenhardt's (1988) proposition that in high-velocity environments effective firms use rational decision-making processes. In formal terms,

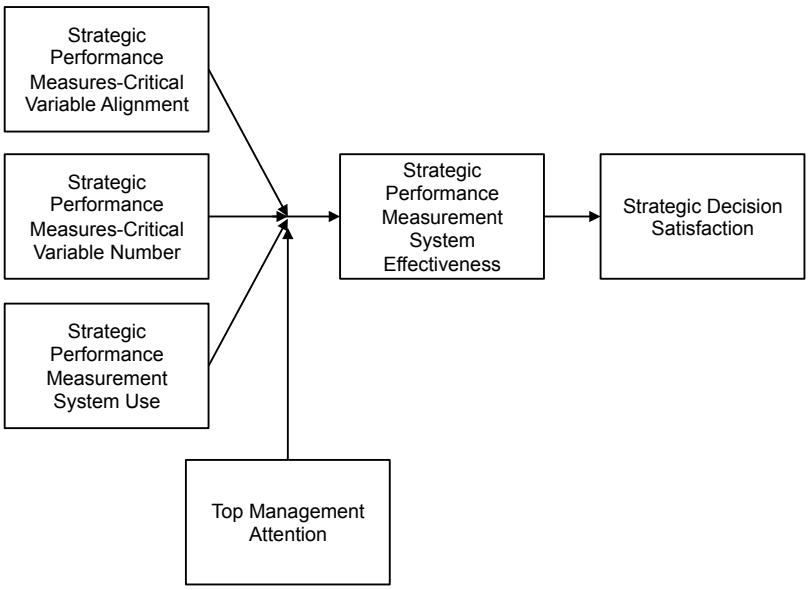
> Proposition 5: In turbulent environments, early and frequent use of strategic performance measures to inform strategic decisions will lead to higher decision satisfaction.

In Section 3.10 the propositions presented are organized into a theoretical model that articulates the variables that should be included in a framework to measure strategic performance in turbulent environments.

3.10. Toward a Model of Strategic Performance Measurement in Turbulent Environments

This research explored how firms operating in a turbulent environment measure strategic performance. Such settings are difficult to operate in because information is voluminous and difficult to collect, management attention is stretched, and mistakes, when made, can be fatal. Beyond a descriptive investigation, the findings are a set of propositions depicted in Figure 3-5.

Figure 3-4: A Model of Strategic Performance Measurement in Turbulent Environments



The first two propositions focus on strategic performance measures. Evidence from the study indicate that firms in turbulent environments do not created balanced sets of performance measures intended to present comprehensive views of performance. Rather, they cluster their measures on critical variables where they intend to monitor performance (Proposition 1). The findings also indicate that within the focused set of performance measures, managers look at a high number of in-depth information decomposed from the high-level performance measures. This enables managers to understand at a very detailed level the subordinate measures that comprise overall performance. This granular measurement focus is the mechanism whereby top managers stay attuned to drivers of performance (Proposition 2). To be effective however, the measures must be aligned with objectives that themselves are aligned with critical variables from within the firms' external environment. If determining the changes in customer needs drives success, then the strategic performance measurement system should be constructed in such a way that information from customers is captured and provided to top managers for use evaluating those changes. So a focused set of in-depth measures will only be effective if the measures are aligned with the most important variables from a firm's operating environment (Proposition 3). Within the model in Figure 3-5, the first two variables encapsulate the first three propositions.

Coupled with the propositions regarding measures is one regarding design and use of the strategic performance measurement system. The findings in the study show that early and frequent use of the strategic performance measurement system seems to have an impact on decision satisfaction. To account for this findings, a variable is included in the model regarding the use of the strategic performance management system, namely, that in turbulent environments, use of strategic performance measurement to inform strategic decisions will lead to higher decision satisfaction (Proposition 5).

Finally, the overall effectiveness of the strategic performance measurement system in informing strategic decisions would be contingent upon objective alignment to critical environmental variables, performance measure alignment and number in critical environmental areas and effective use of the system—all of which are determined in large part by management's aims and attention. When these variables are operating effectively, the strategic performance measurement system should be highly effective and strategic decision satisfaction—as informed by the

system—should be high. This model will serve as the basis for examination in subsequent empirical study Project 3.

3.11. Conclusion

This study began by stating a central premise of performance measurement that managers and researchers have come to believe over the past three decades: performance measurement systems need to be balanced in order to be effective (Eccles, 1991; Kaplan and Norton, 1992; Brown, 1994). The results fail to support this view. Rather, the findings here suggest that in turbulent environments, characterized by high levels of complexity and dynamism, a focused, in-depth performance measurement system aligned with environmental variables that cause turbulence contributes to strategic performance measurement effectiveness more than a comprehensive, balanced system does. The findings support the view that managing in turbulence requires more information, acquired more rapidly than does a stable environment (Galbraith, 1973; Eisenhardt, 1989b). It also confirms previous performance measurement system research regarding the factors that affect the evolution of performance management systems (Kennerley and Neely, 2002), and it suggests refinements based on the uniqueness of measuring critical environmental variables versus business performance in total (Franco-Santos et al., 2007).

Beyond refuting the basic premise of balance in performance measurement, the research provides a model manager's can use to develop effective strategic performance measurement systems in turbulent settings. The model and the elements of it have not been conceptualized previously in this manner. The model is predicated on designing a focused set of in-depth performance measures, orienting those measures and firm-specific objectives on critical environmental variables, using the system effectively and ensuring top managers maintain appropriate attention to those variables. These variables when oriented correctly, should improve the effectiveness of the strategic performance measurement system and, correspondingly, satisfaction with strategic decision-making.

What this study does that previous studies have not is incorporate the effects of *complexity* on strategic performance measurement. Highly turbulent settings are characterized by a large number of variables that change rapidly and interact with one another in ways that are difficult to understand and evaluate (Anderson, 1999). In order for a performance measurement system to be effective, the adoption of

simple rules and exploratory elements may be particularly relevant for examination in future studies.

Finally, the constraints of managerial rationality of performance measurement system design and use could prove fertile research ground. This study finds that strategic performance measurement systems are significantly affected by managers' own biases and limitations in information processing (Simon, 1957). Thus, the views from this perspective could shed light on the challenges firms face in constructing effective strategic performance measurement systems given the limitations of top managers' thinking.

4. Project 3: Strategic Performance Measurement in a Turbulent Environment: Findings from a Transforming Health Care System

4.1 Abstract

4.1.1 Purpose:

This research reports the results of the replication of a model of strategic performance measurement in turbulent environments created from an exploration of seven firms with the security software industry within a single site inside the rapidly transforming U.S. health care industry.

4.1.2. Design/Methodology/Approach:

Using a research framework developed in Project 2—strategic performance measurement findings from seven firms within the security software industry—a single in-depth case study within the U.S. health care industry is conducted. A five unit health care system serves as the research site from which interview data from the 17 members of the top management team along with questionnaire data from 30 other senior managers, archival data, and top team observation are used to assess the effectiveness of the strategic performance measurement system and its link to strategic decision-making.

4.1.3. Findings:

As expected based upon prior findings, the strategic performance measurement system aligns to critical environmental variables, presents higher numbers of performance measurement in critical uncertainty areas and shows strong influence by top management's intent. In contrast to expectations and some literature on the subject, the strategic performance measurement system did not directly inform strategic decisions and the strategic performance measurement system was used both diagnostically and interactively through use of different components of the system itself.

4.1.4. Research Implications:

The study proposes that in a turbulent environment, strategic performance measurement system effectiveness is determined by measure alignment to critical environmental variables, number of measures used and employment that is both diagnostic and interactive. Further, a single strategic performance measurement system can accommodate these features contingent upon top management's aims and attention.

4.1.5. Managerial Implications:

Managers should design and align their strategic performance measurement system to focus on critical environmental variables that affect their firm's performance. They should engage in both diagnostic and interactive use while directing their attention to those variables that have the greatest likelihood of disrupting their businesses.

4.2. Introduction

Academic study in performance measurement has enjoyed steady interest since the early formalization of the field (Ridgway, 1956; Anthony, 1965). Yet despite what has been written since, knowledge regarding how performance measurement and management control systems are actually used in practice remains an underdeveloped area of knowledge (Berry et al., 2009). More remote still are studies that explore how these types of systems function in turbulent environments (Brews and Purohit, 2007). This study aims to contribute to these areas by empirically investigating the relationship between strategic performance measurement and strategic decision-making in a rapidly changing, highly turbulent environment—the U.S. health care industry.

A significant challenge today for managers everywhere is coping with increased levels of environmental unpredictability. Evidence indicates that the environments within which organizations operate today are becoming increasingly volatile (Comin and Mulani, 2006). Turbulence is not a new difficulty for managers, nor is it an unexplored area of organizational literature; the effects of environmental complexity and dynamism on firms have been explored for years (Emery and Trist, 1965; Aldrich, 1979; Dess and Beard, 1984). What is becoming clearer is that organizations face even more complexity than previously understood when rate of change, direction of change, and the full set of critical variables, such as technology, products, regulation, customer preferences, and competitive configurations, are considered (McCarthy et al., 2010). Not surprisingly, the effect of turbulence on firm performance is significant. Firm survival rates have been decreasing over time (Baker and Kennedy, 2002). In order for firms to survive, they have to be able to overcome almost inevitable stalls in performance. An analysis of 500 publicly traded firms from 1955 to 2000 found that 87% of firms stalled at least once during the period, resulting in an average loss of 74% of market capitalization in the decade following the stall (Olson et al., 2008). Given this backdrop, top managers must somehow design management control systems and orient them in a manner that enhances their ability to effectively guide the most critical areas of performance.

One of the ways in which managers cope with turbulence is by focusing management control systems on those variables that are critical to performance. Critical performance variables have historically taken the form of goals and objectives resulting from the strategic planning process (Lorange and Scott Morton,

1974; Steiner, 1979). But this approach to management control is limited and emphasizes almost exclusively the implementation of pre-established goals—effective in environments that are static but hardly realistic in today's highly dynamic environment. Reviews of studies where this type of control is used have confirmed that it can lead to unfavorable effects (Langfield-Smith, 1997). Thus, researchers exploring the intersection of management control systems and strategy have shifted the emphasis away from traditional cybernetic control toward strategic control, in which environmental uncertainty takes a more prominent role in the control system itself (Schreyogg and Steinmann, 1987). Although strategic control still includes pre-formulated goals and objectives, it also acknowledges the critical role of environmental uncertainties. As Lorange et al. (1986) point out, "the central thrust of our argument is that strategic control is exercised by firms making the firm more sensitive to external changes. Such sensitization facilitates organizational learning and adaptive change." (Lorange et al., 1986, p. 22). This view has brought contemporary control systems into alignment with the concept of emergent strategy, which regards strategy not only as a set of intended choices but also as forms of action that are responses to environmental stimuli (Mintzberg and Waters, 1985) or as a pattern in a stream of important decisions (Hambrick, 1982). Understanding critical variables and having the strategic control system mapped to them should then be a central feature of an effective performance measurement system.

But the effectiveness of a management control system is moderated by managers' ability to focus and direct attention on issues vital to the firm's successful functioning. Although the assumption persists that managers behave in rational ways, this view is tempered by the theory that managerial rationality is ultimately bounded (Simon, 1947). This "boundedness" may result in managers directing firm attention to a limited set of issues—those deemed by managers as germane to effective firm functioning (Ocasio, 1997). Rationality is also impacted by limitations in managers' ability to process information, since there is a point at which managers cannot continue to effectively process both new and existing information simultaneously (Galbraith, 1973). Variations in firm performance have been attributable to variations in strategy (Rumelt et al., 1994); it can then be reasonably presumed that variations in managerial rationality and information-processing limitations, coupled with choices governing the direction of attention, will also lead to fundamental variations in the design and use of management control and performance measurement systems.

Given the changes in the environment and the recognition that management behavior plays a much more active role in management control system design and use, new theories on management control and what constitutes a control system have been developed (Otley, 1999). Further, views have been developed that consider control systems as being composed of belief, behavioral and rational choice control (Simons, 1991). The Levers of Control framework of Simons, and its antecedents, shifts the historical view of control from simple accounting-based forms into an integrative framework that recognizes the need to accommodate choices, actions, and preplanned performance requirements while considering environmental uncertainties (Simons, 1994). The framework recognizes four levers that comprise an integrated system of management control consisting of four separate subsystems: beliefs (e.g. core values), boundaries (e.g. behavior limits), diagnostic (e.g. monitoring and evaluating) and interactive (e.g. management engaged). Because of its integrating structure, numerous studies have been conducted to determine how it is used in practice (Tuomela, 2005; Widener, 2007). Findings indicate that performance measures—the root of virtually all management control systems—can at one time be used both diagnostically and interactively. Whether or not this use extends to highly dynamic settings is not known and is a research goal of this study.

Regardless of variations in how systems are designed or used, the purpose of a management control system is to provide information useful to management planning, evaluation, and decision-making (Merchant and Otley 2006). Management pundit Drucker (1966) notes that decision making "is the *specific* executive task" and academic research has been ongoing in the area since the statement was made (Drucker, 1966, p. 113). More recently, studies have been conducted in the area of how top managers make strategic decisions (Eisenhardt and Zbaracki, 1992); how mental models influence decisions (Gary et al., 2012); which factors contribute to managers making erratic strategic decisions (Mitchell et al, 2011); and relevant to this study, how fast strategic decisions are made in high-velocity settings (Bourgeois and Eisenhardt, 1988). In her study of technology companies, Eisenhardt (1989b) indicates that the information managers use to facilitate fast decisions in high-velocity environments is real-time data—"information about a firm's operations or environment for which there is little to no time lag between occurrence and reporting" (Eisenhardt, 1989b, p. 549). She also notes that executives pay close attention to a variety of quantitative performance information—bookings, scrap,

inventory, engineering schedules, and a number of others (Eisenhardt, 1989b). Given the need for real-time information about both operations and competition, there is an opportunity to better understand what specific information is provided, how it fits within the strategic control system, and how it is used by top managers to make strategic decisions (Hambrick and Mason, 1984).

Given the paucity of empirical information regarding strategic performance measurement in turbulent environments, this research makes several important contributions. First, as discussed previously, the rate of change and complexity prevailing in the external operating environment is increasing and thus it is essential that managers know how to develop and use the performance measurement system when these types of conditions are the norm rather than the exception. Second, management attention and interpretation of environmental conditions should influence the way in which managers' design and use management control systems and performance measures. This research provides the opportunity to examine how comprehensive strategic performance measurement frameworks—in this case Simon's Levers of Control and Kaplan and Norton's Balanced Scorecard—are operationalized within a turbulent environment (Simons, 1995; Kaplan and Norton, 1996a). Finally, the role of strategic performance measures in strategic decision-making is not clear in academic literature; this research contributes to knowledge regarding the specifics of performance measures used, the ways in which they are used, and how they contribute to strategic decisions as an element of an overall system of management control.

4.3. Research Design

4.3.1. Primary Research Question

This study set out to address the research question: *how do firms in turbulent environments measure strategic performance?* The starting point is previous strategic performance measurement system research conducted by the author inside seven firms within the security software industry.[3] The purpose of the initial study was to identify a mid-range theory reflected in preliminary research propositions that answers the research question; the aim of this study is to

[3] For detailed information on the study and the findings see "Strategic Performance Measurement in a Turbulent Environment: Evidence from Security Software Firms," Barrows, E.A., 2013.

contribute to the further refinement of that theory by assessing the propositions in a different, but equally turbulent, setting.

4.3.2. Research Setting

The research site is the health care industry, specifically, the health care delivery portion of it. The health care industry in the United States is undergoing perhaps the most dramatic change in recent history. Current problems within the industry stem from high costs, inconsistent service, ongoing errors, and limited access to care (Porter and Teisberg, 2006). From the cost perspective, U.S. health care costs exceed 17% of gross domestic product and are expected to continue to rise in the future if left unattended (Kaplan and Porter, 2011). The Hospital Consumer Assessment of Healthcare Providers and Systems survey—the national standardized reporting survey reflecting patient sentiment—reports for the period for which the most recent discharge data was available that the percent of patients who reported that their overall experience was the most positive possible was only 70%.[4] The National Quality Forum (2013) estimates that preventable errors cost the United States between $17-$19 billion per year in health care expenses, lost worker productivity, and disability. But perhaps most significant, is the fact reported in the *New York Times* that approximately 48 million Americans or 15% of the population do not have health care coverage (Pear, 2013). Fortunately, these sobering statistics are starting to change.

On March 23, 2010, President Barack Obama passed into law the Patient Protection and Affordable Care Act. The Accordable Care Act, or Obama care as it is more commonly known, is the most significant piece of health care legislation enacted since the establishment of Medicare and Medicaid in 1965. It requires all Americans to purchase health care insurance and requires insurance providers to offer programs to cover them. Because of the requirement for all citizens to have health care, there is significant pressure being levied on health care delivery systems to reduce costs while simultaneously improving health outcomes. Further, the mechanism to reimburse systems—historically based on a fee-for-service model—is transitioning to what is known as a global payment model. Instead of insurance organizations reimbursing providers for the cost of their services, systems will be given a fixed amount of revenue per person covered. Health care systems will be

[4] Data from Summary of HCAHPS Questionnaire Results* April 2012 to March 2013.

responsible not only for providing high quality care but also for managing the cost of care. The new payment model effectively shifts risk from the payers to the providers. This is a tectonic shift in the business model of the entire industry and one that having a major impact on providers everywhere.

To study the effect of the Affordable Care Act and other changes associated with reimbursement reform on health care firms, Care New England Health System, a five-unit system in Providence, Rhode Island, was selected as the study site. Rhode Island in many respects represents a microcosm of the health care change occurring at the national level. According to the U.S. Census Bureau, Rhode Island has just over 1 million residents compared the 316 million in the entire nation. Per capita income in Rhode Island is $30,000 versus $28,000 in the entire Unites States. Twelve percent or 120,000 Rhode Islanders are uninsured. The largest insurance payers in the state are Medicare and Blue Cross/Blue Shield of Rhode Island.

The state is served by two large health care delivery systems and a number of smaller regional or stand-alone hospitals. Lifespan is the state's first and largest system founded in 1994. This system has four hospitals with a total of 1,155 beds, 12,573 employees, and 55,777 inpatient discharges annually (FY 2012). The second largest system in the state is Care New England.

Established in 1996, Care New England supports 643 licensed beds and 6,880 employees. The system, geographically disbursed throughout northern and central Rhode Island, provides care through five separate health care delivery organizations. Butler Hospital is a psychiatric hospital located in Providence with 143 beds and 7,000 discharges annually. Kent Hospital, located in Warwick, is the second largest community hospital in Rhode Island with 359 beds and 15,000 discharges annually. Memorial Hospital, located in Pawtucket, is a 294-bed community hospital with 6,000 discharges per year. Women and Infants Hospital in Providence is a specialty hospital providing a full range of obstetrics and gynecology services for women. Women and Infants supports 8,600 births per year and 20,000 discharges annually. The Visiting Nurses Association, based in Warwick, offers a full line of care for adults, including end-of-life care, for adults via 6,000 outpatient visits annually. An organization chart is included at Section 6.6.

On August 1, 2011, Care New England's board of directors named Dennis Keefe as the system's new chief executive. His specific charge was to create an integrated

health care system capable of navigating the rapidly changing health care environment. Shortly after his arrival, he set out a new vision for the system that included establishing a strong primary care base and providing services across the care continuum, all while delivering care of highest quality at the most competitive cost. His ambitious new vision, Care New England's complex organizational form, and Rhode Island's representative economic and political structure provided the ideal environment in which to conduct the study.

4.3.3. Research Propositions

The starting point for assessment of a theory using a case-based approach is the articulation of clear research propositions incorporating the concepts specified (Dul and Hak, 2008). This enables ready operationalization of the concepts when assessment is being conducted. The propositions being tested were induced from Project 2 and are presented in Table 4-1.

Table 4-1: Study Research Propositions

Proposition 1: In turbulent environments, strategic performance measures will be clustered on critical environmental variables.
Proposition 2: In turbulent environments, strategic performance measures will be present in greater number in critical environmental variable areas.
Proposition 3: In turbulent environments, strategic objectives will be aligned to critical environmental variables.
Proposition 4: In turbulent environments, the focus of management's attention will be the primary factor affecting the orientation of the strategic performance measurement system.
Proposition 5: In turbulent environments, early and frequent use of strategic performance measures to inform strategic decisions will lead to higher decision satisfaction.

Each of these propositions is transformed into research concepts and questions that enable further assessment. The purpose of the assessment is to determine whether or not the concept is a necessary element of the theory being postulated.

4.3.4. Research Concepts and Definitions

Nine research concepts are used in the assessment. Each concept is articulated and defined in Table 4-2, which summarizes the research concepts with references to the concepts' sources in relevant literature.

Table 4-2: Research Concepts

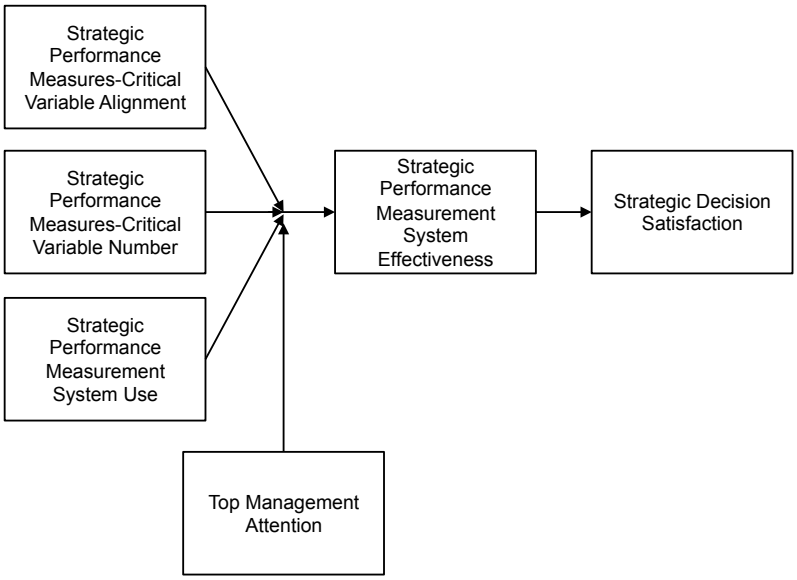
Concept	Definition	References
Critical Environmental Variables	Operating environments are comprised of a number of underlying variables. Typical variables include technology, products/services, demand, regulatory issues, and competitive configuration. Not all variables are of equal gravity in terms of impacting industry participants—some have a greater effect than others. Critical environmental variables are those variables that have the most significant effect on the environment and its participants in particular.	Emery and Trist, 1965; Aldrich 1976; Dess and Beard, 1984; McCarthy, et al., 2010
Environmental Turbulence	Environmental turbulence is a gauge that reflects the magnitude of change for each variable as well as the rate of change for those variables. The greater the number of variables involved, the greater their level of change and the greater the speed of change, the higher the level of environmental turbulence.	Emery and Trist, 1965; Aldrich 1976; Dess and Beard, 1984; McCarthy et al., 2010
Strategic Performance Measures	Performance measures are metrics used to quantify the efficiency and effectiveness of an action. Strategic performance measures are performance measures that present managers with financial and non-financial data and information covering different perspectives; in combination, they provide a way of translating strategy into a coherent set of performance measures.	Bourne et al., 2003; Chenhall, 2005
Performance Measure Number	Strategic performance measure number reflects the number of performance measures used or focused on a particular variable of interest within an organization's performance measurement system.	Eisenhardt, 1989b
Performance Measurement System	A performance measurement system can be defined as the set of metrics used to quantify both the efficiency and effectiveness of an action.	Bititci et al., 1997; Bourne et al., 2003; Franco-Santos et al., 2007
Firm Objectives	Discrete elements of an overall strategy that reflect essential actions the firm must achieve in order to be successful. Can also incorporate key success factors—attributes, competencies, and capabilities that are seen as critical prerequisites for success of an organization in its industry at a certain point in time.	Otley, 1999; Ferreira and Otley, 2009
Management Attention	The items and issues of interest that firm decision-makers focus their attention on.	Ocasio, 1997
Performance	The purposes and disposition of information	Anthony, 1965;

Measurement System Use	provided by control system in helping to accomplish the firm's objectives.	Simons, 1994; Ferriera and Otley, 2009
Strategic Decision	A strategic decision is one that is important in terms of the actions taken, the resources committed, or the precedents set. Strategic decisions typically involve strategic positioning, have high stakes, involve as many functions of the firm as possible, and are considered representative of the process by which major decisions are made by the firm.	Eisenhardt, 1989b; Eisenhardt and Zbaracki, 1992

4.3.5. Research Model

The research concepts are organized into a model that depicts how they interact within an organization operating within a turbulent environment. The model is shown in Figure 4-1.

Figure 4-1: Model of Strategic Performance Measurement in Turbulent Environments



4.3.6. Model Overview

The starting point for the research is the overarching view that the strategic performance measurement system and key aspects thereof inform strategic decisions. Strategic decisions are, by their definition, high-stakes decisions and the

strategic performance measurement system would then be expected to play a vital role in informing those decisions. Firms that have effective strategic performance measurement systems should enjoy higher levels of decision satisfaction. The model shows that there are three drivers of strategic performance measurement system effectiveness. The first is alignment between strategic performance measures and critical environmental variables. The model anticipates strong alignment between the two on occasions where the system is effective. The second is the number of strategic performance measures oriented on critical environmental variables. The model presumes that where there is uncertainty there should be an increased number of performance measures to gauge that uncertainty. The third is strategic performance measurement system use. For the system to provide beneficial information, it should be frequently used. Finally, top management attention is expected to moderate the three drivers of system effectiveness given that top managers are the ultimate creators and consumers of system information.

4.3.7. Research Questions

To operationalize the model as described, research questions are formulated from the research concepts. The purpose of the formulation is to facilitate data gathering and assessment in order to determine if the concept should be included in the model as is, included in the model with refinement, or omitted from the model entirely. This approach provides the means to evaluate and refine the independent concepts based on the presence of the dependent concept. Each of the independent concepts is being evaluated to determine its presence when the dependent concept is present. Table 4-3 presents the research concepts and research questions that are evaluated in the study.

Table 4-3: Dependent and Independent Variables and Associated Research Questions

Dependent Variable	Independent Variables	Research Question
Strategic Decision Satisfaction	Strategic Performance Measurement System Effectiveness	(RQ1) When strategic decisions are satisfying, is the strategic performance measurement system is effective?
	Strategic Performance	(RQ2) Given the strategic performance measurement system's effectiveness, is there strategic performance

	Measure—Critical Variable Alignment	measurement clustering on critical environmental variables?
	Strategic Performance Measure—Critical Variable Number	(RQ3) Given the strategic performance measurement system's effectiveness, are strategic performance measures present in significant numbers in critical environmental variable areas?
	Strategic Performance Measurement System Use	(RQ4) Given the strategic performance measurement system's effectiveness, is strategic performance measurement system use high?
	Top Management Attention	(RQ5) Given the strategic performance measurement system's effectiveness, is management attention to critical environmental variables high?

4.3.8. Research Questions and Measurement Development

In order to test the research questions presented, each of the nine concepts associated with the questions needs to be articulated and described in terms of how it will be assessed during examination. Only concepts and measurement methods are described here; analysis findings are discussed later in Section 4.6, Findings and Discussion.

4.3.9. Critical Environmental Variables and Turbulence

The environment within which a firm operates is comprised by a number of environmental elements, such as suppliers, competitors, and competition (Aldrich, 1979). The more elements there are and the greater the number of configurations these elements can morph into, greater the level of environmental complexity (Dess and Beard, 1984). When the elements themselves or through combination increase, they become more difficult to interpret. This complexity is compounded further when the variables themselves start changing and becomes even more challenging when the rate of change accelerates. This change in acceleration rate and configuration creates turbulence, which challenges managers' ability to accurately interpret and act on signals coming from the environment (McCarthy et al., 2010). That said, there is a subset of variables that might be considered critical in the sense that top mangers believe they contribute to the preponderance of risk or uncertainty facing the firm (Simons, 1995). These variables will be identified during evaluation.

For assessment, during semi-structured interviews top managers are first asked to assess on a 1-10 scale the level of change taking place in the external environment

today. They are then asked to list in order from most to least significant those environmental variables they believe to be the causing most of the change in the industry. To confirm that the initial set provided by the top team is in fact accurate, a questionnaire of the second layer of leaders is conducted to corroborate the responses of the initial group. Variances are noted and explained. Finally, additional confirmation is obtained by examining published research from leading industry sources that cite the causes of change in health care today.

4.3.10. Performance Measures, Strategic Performance Measures, and the Strategic Performance Measurement System

A performance measure is a metric that quantifies the efficiency and effectiveness of an action, and a performance measurement system is the set of metrics used to quantify both the efficiency and effectiveness of actions (Neely et al., 1995). Although organizations often have a wide array of performance measures aimed at gauging performance in areas ranging from financial and quality performance to employee satisfaction and project management, the particular measures for this study are strategic performance measures. Chenhall (2005) describes strategic performance measures as those "that present managers with financial and non-financial measures covering different perspectives, which, in combination, provide a way of translating strategy into a coherent set of performance measures" (Chenhall, 2005, p. 396). Strategic performance measures are often aggregated into a strategic performance measurement framework (Neely and Adams, 2001). One of the most commonly used strategic performance measurement frameworks is the Balanced Scorecard (Kaplan and Norton, 1992). What makes measures strategic is their use as a mechanism to evaluate an organization's intended strategy, which is often reflected in a written strategic plan or in some cases through the use of a visual aid like a strategy or success map (Kaplan and Norton, 2000a; Neely et al., 2002).

During semi-structured interviews top managers are asked to evaluate how effective the system's strategic performance measures are (e.g. those that are contained on the Balanced Scorecard) and how frequently the Balanced Scorecard is used. The Balanced Scorecard has been in place for two years at the research site. Further, all managers being interviewed were involved in the development of the Balanced Scorecard so they are highly familiar with it. To confirm their responses, a questionnaire that asks the next layer of managers below the top team to rate the effectiveness of Balanced Scorecard measures is conducted.

4.3.11. Performance Measure Number

Per Kaplan and Norton (1996a), the Balanced Scorecard—to be optimally effective—should contain a maximum of 25 performance measures. However, evidence from Eisenhardt (1989b) indicates that in high-velocity environments, top managers need to look at more information not less, in particular regarding operations and the competitive environment. Given that the number of measures proposed by Kaplan and Norton is for diagnostic use, the expectation is that measures—or their proxies—are present in a number greater than 25.

Individual Balanced Scorecard measures are examined for the two years the framework has been used by Care New England. Further, financial performance measures, operational measures and quality measures are examined to approximate the number of performance measures used for purposes of strategic performance measurement. These findings are compared to the point of reference (i.e., 25 measures) proposed by the Balanced Scorecard's creators.

4.3.12. Objectives

Objectives are discrete elements of an overall strategy that reflect essential actions the firm must achieve in order to be successful (Otley, 1999). Objectives can also incorporate key success factors—attributes, competencies, and capabilities that are seen as critical prerequisites for success in an organization within its industry at a certain point in time (Ferriera and Otley, 2009). The Balanced Scorecard in place at Care New England contains objectives in addition to strategic performance measures. Objective formulation within the framework of the Balanced Scorecard is consistent with literature on its proper contemporary (Kaplan and Norton, 2000a).

For assessment, the alignment between critical environmental variables and Care New England objectives are examined to determine the consistency between stated system strategy and those drivers of change viewed as important to top managers.

4.3.13. Strategic Decisions

The dependent variable and primary research object for this study is a specific set of strategic decisions. A strategic decision is one that is important in terms of the actions taken, the resources committed, or the precedents set (Eisenhardt and Zbaracki, 1992). Per Eisenhardt's (1989b) study of decision-making in a high-velocity

environment, strategic decisions typically involve strategic positioning, have high stakes, involve as many functions of the firm as possible and are considered representative of the process by which major decisions are made by the firm. Three decisions made by the top team during the past 18-24 months that were considered to be satisfying are selected for analysis. Each decision is described in the Section 4.4.1, Research Objects. The satisfaction level is confirmed with the top management team prior to the commencement of evaluation compared to the independent variables.

4.4. Method

In this study, a case-based approach to proposition refinement is adopted. This was done for several reasons. First, it is generally accepted that case studies provide valuable insights into settings where little is known and rich descriptions are necessary to illuminate concepts and variables under investigation (Yin, 2003). The functioning of a strategic performance measurement system in the U.S. health care industry meets this standard. Second, because this is initial theory evaluation, it is being conducted to refine a theory under development. This approach enables the determination of which propositions merit inclusion in the research as is, which ones merit inclusion with refinement, or which ones require exclusion from the theory (Roethlisberger, 1977; Dul and Hak, 2008). Finally, this approach facilitates both theory evaluation and generation of novel insight from the new environment especially since the U.S. Health Care industry is undergoing perhaps the most significant change in it's history. Case base research is particularly well-suited for this.

4.4.1. Research Objects

Two research objects comprise the study: a set of recent strategic decisions and Care New England's strategic performance measurement system. The first research object in this study is the strategic decision. Decision-making is arguably the most important activity managers engage in (Drucker, 1966), and strategic decisions—those that involve high stakes and firm positioning—are among the most crucial. The second research object is the strategic performance measurement system, and in this case, the Balanced Scorecard. Care New England implemented the Balanced Scorecard two years prior to the start of this study; at the time of the study the top management team was developing their third iteration of the framework. A segment of the most recent Balanced Scorecard is contained in Section 6.7. As the

manifestation of the strategic performance measurement system, the Balanced Scorecard should be critical in helping a firm implement it's strategy and monitor the environment (Lorange et al., 1986; Chapman, 2005). Because of the role it plays in helping moderate top management's understanding of both intended and emergent strategy, the Balanced Scorecard was chosen as another research object for the study.

4.4.2. Strategic Decisions

Prior to the start of data collection, the CEO identified three major strategic decisions that Care New England had made within the past 12-18 months. The decisions are highlighted in the following subsections.

4.4.2.1. Apply for the Malcolm Baldrige National Quality Award

The Malcolm Baldrige National Quality Award is the nation's highest honor for performance excellence (National Institute of Standards and Technology, 2013). Established in 1987 to improve the competitiveness of the manufacturing sector, the award today recognizes outstanding performance by organizations in the service, education, health care and government/nonprofit sectors. Given the focus nationwide on improving health care outcomes, reducing errors, and lowering cost, the Baldrige Criteria for Performance Excellence on which the award is based have commanded considerable attention in the U.S. health care industry (Foster and Chenowith, 2011).

In Care New England's Five-Year Strategic Plan (dated 2012), the executive team and the board agreed that the organization would pursue a national quality award. In the months following the development of that goal, executives began looking into the various quality awards that the system could apply for and ultimately win. Shortly after the arrival of the new CEO, the organization made the decision to apply for the Baldrige award. It typically takes an organization several years to earn the award and requires a significant transformation in the way the organization performs its work. This process was under way at the time of the investigation. Given these facets of the decision, along with Care New England's stated strategy of providing the highest quality of care for the best value in the region, the decision to apply for the award is deemed strategic.

4.4.2.2. Develop a Strategic Partnership with Blue Cross/Blue Shield of Rhode Island

One of the largest private insurance providers in Rhode Island's $3 billion insurance industry is Blue Cross/Blue Shield of Rhode Island. Founded in 1939, Blue Cross/Blue Shield of Rhode Island provides coverage to more than 600,000 of the state residents through a network of more than 9,000 providers. Care New England has, over the years, had a highly tumultuous relationship with Blue Cross/Blue Shield of Rhode Island, and leaders at one time came close to terminating their agreement with the plan. Tense contract negotiations resulted in bitter feelings between the organizations, which were the prevailing sentiment prior to the arrival of Dennis Keefe as Care New England's chief executive.

In May 2011, Blue Cross/Blue Shield of Rhode Island announced the arrival of a new CEO, Peter Andruszkeiwicz. A long-time insurance industry veteran and someone with a track record of working successfully in a collaborative environment, the new CEO was eager to set a new direction for an organization that historically had not been viewed favorably by the providers in the state. In August 2012, Care New England and Blue Cross/Blue Shield of Rhode Island announced that they had renegotiated their contract and struck a partnership designed to improve both health care delivery and patient outcomes while containing rapidly growing health care costs. The agreement was the first of its kind in the state and considered to be a model for provider-payer collaboration for the health care community at large. Because of the nature of the partnership, it is deemed to be a strategic decision.

4.4.2.3. Acquire Memorial Hospital

A central element of the Care New England strategy is the development of a strong network of primary care physicians within the overall system. According to the American Academy of Family Physicians (2013), primary care are is defined as "care provided by physicians specifically trained for and skilled in comprehensive first contact and continuing care for persons with any undiagnosed sign, symptom, or health concern not limited by problem origin, organ system or diagnosis." The Care New England CEO believed that to be successful in the transforming landscape of health care, a strong primary care posture was necessary. At the time of his arrival, Care New England had only three primary care physicians.

The decision to acquire Memorial Hospital was considered essential to the future success of Care New England because the hospital had one of the most respected primary care staffs in the state. Further, Memorial had an exclusive agreement with Brown University Medical School to offer placement to medical residents specializing in primary care. Because of the linkage to the Care New England strategy, this decision is considered strategic.

4.4.3. Data Collection

Data collection took place over the course of four months from November 2013 to February 2014. The effort proceeded in three phases, which were intended to gain a comprehensive evaluation of how the three strategic decisions were informed by the strategic performance measurement system.

4.4.3.1. Executive Team Interviews

With the CEO's permission, all executive team members were interviewed to elicit their perspectives on the external environment, the strategic performance measurement system, and the three strategic decisions identified by the CEO (Sections 4.4.2.1-4.4.2.3). Each executive contacted agreed to the interview. The interviewees, along with their titles and organizational affiliation, are listed in Table 4-4.

Table 4-4: Care New England Executive Team Interviewees

#	Name	Title	Entity
1	Boss, Alyssa	SVP, General Council	Care New England
2	Beaudin, Paul	SVP, Chief Financial Officer	Kent, Memorial
3	Coletta, Sandy	CEO, Kent Hospital	Kent
4	Costa, Gail	Chief Strategy Officer	Care New England
5	Dacey, Michael	Chief Clinical Integration Officer	Care New England
6	Diaz, Walter	SVP, Site Operations	Butler
7	Delmonico, Domenic	SVP, Health Plans and PHOs	Care New England
8	Keefe, Dennis	CEO, Care New England	Care New England
9	Kernan, May	SVP, Marketing Communications	Care New England
10	Marcantano, Mark	Acting President	Women and Infants
11	Phipps, Maureen	Executive Chief, OB/GYN	Care New England
12	Powrie, Ray	Chief Medical Quality Officer	Care New England
13	Recupero, Pat	CEO, Butler Hospital	Butler
14	Roberts, Nancy	CEO, Visiting Nurse Association	Visiting Nurse Association

15	Schottland, Ed	CEO, Memorial Hospital	Memorial
16	Sutherland, Jack	CFO, Care New England	Care New England
17	Walsh, Marilyn	SVP, Human Resources	Care New England

Seventeen interviews were conducted in total. The interviews were held either in person or over the phone and lasted from 35 minutes to 75 minutes each. Every interview was recorded after gaining the agreement of the interviewee (the promise of individual anonymity was provided). Shortly following the interview, each audio file was transcribed using Dragon speech recognition software. This commenced the data analysis process. A sample of an anonymized transcribed interview is provided in Section 6.8. The transcription and subsequent review enabled the exploration of the strategic performance measurement system and practices by understanding how each decision was (or was not) informed by the system or various components thereof. After the interviews were transcribed and organized in the format of the semi-structured questions, the data were organized into a series of data screens keeping in mind Miles and Huberman's (1994) seminal guidance: "You know what you display." In contrast with project 2, the interviews were not distilled into descriptive case studies about the decisions, since the purpose was not to build written case studies for further analysis but rather to extract from the interviews specific data that could be used to examine the relationships among the constructs hypothesized in Figure 4-1.

4.4.3.2. Questionnaire Administration

To complement the initial findings from the interviews with the top team and extend the investigation further into the organization, a questionnaire with the next level of leadership below the highest echelon was developed. This layer included 50 senior leaders from within the Care New England Health System. Collecting these data made it possible to determine whether the top team's views were consistent with the views of leaders at the next level. The questionnaire was conducted over a five-day period in February using the online tool SurveyMonkey. Thirty executives responded to the questions after the initial request and one subsequent follow up. The questions and instrument are provided in Section 6.9. The instrument consists of eight multiple-choice questions, each using a 10-point scale. The questions solicit the respondent's opinions on various aspects of the strategic performance measurement system. Additionally—and largely for the benefit of the top team—a single free-response question was asked to identify where improvements to the

strategic performance measurement system might be made to make it more effective. Those responses are not included in this study.

4.4.3.3. Supplemental Information

In addition to interview data and questionnaire responses, supplemental information for purposes of triangulating data on respondent views and creating other displays was collected. This information included the following: six months of weekly newsletters, one year of meeting agendas for the top management team, two years of Balanced Scorecard data, two years of quality scorecard information, and selected data developed for Care New England's 2014 Malcolm Baldrige National Quality Award application. Internal financial information and performance data were also examined. This information can be viewed in the appropriate data analysis section.

4.5 Data Analysis

This section presents the data analysis associated with the exploration of each research concept shown in Figure 4-1. The evaluation is being conducted to determine the strength of the independent variables when the dependent variable is present. Within the subsections that follow, the five research questions discussed in Table 4-3 are addressed. Data are presented from various analyses that evaluate each research question independently. In some cases multiple sources of data are used to strengthen the validity and reliability of the tests conducted. After the presentation of the test data, conclusions are discussed based on the data presented. Where appropriate, literature relevant to the examination is referenced.

4.5.1. Turbulence Level

Before the evaluation was started, confirmation was given—from the study participants' perspective—that the environment was in fact, turbulent. While the discussion in the preamble points to increasing levels of turbulence, it was important to confirm this with the study.

4.5.2. Top-Team Findings

For the top-team interviews, each respondent was asked to assess the level of environmental change from the viewpoint of his or her own industry experience. The findings are presented in Table 4-5.

Table 4-5: Respondent Assessment of Environmental Turbulence[5]

Executive	Level	Description
Executive 1	High	Healthcare costs are so high, it's no longer just a sound business practice to get your costs down, it's a necessity if you are going to survive.
Executive 2	High	The change we're undergoing now is unprecendented in my experience.
Executive 3	Very High	A very significant change but not unlike the one we saw in the early 1980s
Executive 4	Very High	I would say it's very high level of change and I think that there has been and what is most interesting is the that the accelleration of change has been dramatic over the past couple of years.
Executive 5	Very High	The only thing predictable is change; it's unpredictable in terms of behavior from payors, the Federal Government, heathcare organizations who are trying to position themselves to be successful in the future… and it's an uncertain future.
Executive 6	Very High	The current environment of fee for service is going to change although we don't know when and how and so community based providers are nervous and making decisions based on guessing.
Executive 7	Very High	I would say it's tumultuous--very high. It's a thrill a minute.
Executive 8	Very High	It's extremely high and I don't know if all the changes have hit the ground yet.
Executive 9	Very High	It's as high as I've ever seen it.
Executive 10	Very High	Change is the new normal. I think that there used to be changes and then a rest that gave us some time to catch up but it's continually chainging and you have to be very swift and adept at adjustments, correcting your course because there's never been anything like this in healthcare.
Executive 11	High	I would say high levels of change but not necessarily extreme.
Executive 12	High	Healthcare costs as a percentage of GDP (or anything) have now reached a tipping point.
Executive 13	High	On a scale of 1 to 10, I'd say its an 8.
Executive 14	High	I would say that because I think market pressure, pressures in the general economy, pressures with heathcare reform have all forced us to look at things in a totally different manner.
Executive 15	High	I would put it in the 8 out of 10 range.
Executive 16	High	The last couple of years have been amazing in our industry. There's signficant change in the industry in terms of the way we're delivering care now and the way we'll be delivering care in the future
Executive 17	Very High	I would say the level of change is as great as any time in my career.

Important to note is that the average amount of time senior executives had been working in the health care industry was approximately 25 years. The most junior respondent had been in the industry for 10 years and the most senior 41. All respondents noted that the level of change was either high or very high. A few said they had seen dramatic change before, particularly during the early 1980s with the advent of health maintenance organizations. More common was the perspective that the industry was undergoing a tectonic shift, the likes of which had not been experienced previously. There was a sense among the top team that many variables were moving at once: reimbursement reform, policy changes, cost pressures from payers, the push for greater information transparency, and industry consolidation. Further, the pace of change was viewed as accelerating, which was, for many respondents, a new and discomforting experience. This finding—that many variables were changing, some in different directions (e.g. payment), and at an

[5] The executive's name has been removed and the order changed from Table 4-4 to ensure anonymity.

accelerated rate—is consistent with the view that the health care environment is becoming more complex and more turbulent.

4.5.3. Senior Team Findings

In the questionnaire, the senior team's responses confirmed the top team's interview responses. The question, the data table, and the grouped responses by scale point are presented in Table 4-6.

Table 4-6: Questionnaire Respondents' Assessment of Environmental Turbulence

Based upon your experience, please rate the level of environmental change the health care industry is currently experiencing.		
Answer Choices	Responses	Percentages
1 (Very Low)	0	0%
2	0	0%
3	0	0%
4	0	0%
5	0	0%
6	0	0%
7	1	3.33%
8	5	16.67%
9	12	40%
10 (Very High)	12	40%
Don't Know	0	0%
Total	30	

Per the table, 29 respondents, or 96.6% of managers, believed the level of change taking place in the environment could be described on the scale as either an 8, 9, or a 10. The weighted average was 9.2. This provided further evidence that the environment is sufficiently turbulent for purposes of further evaluation.

4.5.4. Strategic Decision Satisfaction

The starting point for model evaluation is with the set of strategic decisions. In order to test the relationship of each independent variable to the set of strategic decisions as dependent variable, it was necessary to find decisions, which were satisfying. After the CEO identified the three strategic decisions (sections 4.4.2.1-4.4.2.3), he assessed his satisfaction level with each of them—high at the time of the interview. During the subsequent top-team interviews, top-team members were each asked to

describe their role in the strategic decision and provide a discussion of how the decision was made, from their perspective. When they were finished describing their role and explaining how the decision was made, each was asked to highlight what they believed the organization's satisfaction was with each decision. The scale provided verbally to each interviewee was a seven point Likert scale ranging from "highly dissatisfied" to "highly satisfied," with "neither" being the central point. Table 4-7 presents the summary of respondent satisfaction level by strategic decision.

Table 4-7: Respondent Satisfaction with Strategic Decisions[6]

Executive	Baldrige Decision	BCBSRI Decision	Memorial Decision
Executive 1	Satisfied	Highly Satisfied	Satisfied
Executive 2	Very Satisfied	Very Satisfied	Very Satisfied
Executive 3	Satisfied	Unknown	Neither
Executive 4	Highly Satisfied	Highly Satisfied	Highly Satisfied
Executive 5	Satisfied	Satisfied	Unknown
Executive 6	Satisfied	Satisfied	Somewhat Satisfied
Executive 7	Satisfied	Unknown	Very Satisfied
Executive 8	Satisfied	Satisfied	Neither
Executive 9	Very Satisfied	Very Satisfied	Satisfied
Executive 10	Very Satisfied	Very Satisfied	Very Satisfied
Executive 11	Satisfied	Satisfied	Satisfied
Executive 12	Satisfied	Satisfied	Satisfied
Executive 13	Satisfied	Very Satisfied	Satisfied
Executive 14	Highly Satisfied	Satisfied	Satisfied
Executive 15			
Executive 16	Satisfied	Satisfied	Satisfied
Executive 17			

Based on the respondent findings, the decisions were—on average—very satisfying. No individual response indicated dissatisfaction of any kind. However, there were occasions where responses were either "neither" or "unknown".

For the Blue Cross/Blue Shield of Rhode Island decision, unknown responses were given because the partnership agreement, though promising, had not been fully implemented. In the words of one executive who responded as "unknown" to satisfaction level,

> "So new levels of transparency and trust in that position swap was evident. And that happened very early on following the partnership agreement. So I would say that was something that really reinforced

[6] Executive 15 provided decision analysis that related to decisions at an operating-unit level because of his limited involvement at system level. Executive 17 was not working for Care New England Health System at the time when the decisions were made.

> it quickly. But then there was a lull about six to eight months where we really were trying to figure out how to work with one another."

Overall he felt the agreement was promising but that the benefits had not been fully felt yet. Another executive who was not involved with the decision directly noted that there were different types of satisfaction among employees depending on their organizational level.

> "I'm sure that there is an organizational satisfaction level at this point. But in terms of the entire leadership team or even going further down into the organization, I'm not sure there's a sense of progress or satisfaction."

However, neither of these respondents noted the decision was poor or unsatisfying but rather, that more time would be required until the full impact of the actions resulting from the decision were felt.

"Unknown" or "neither" responses for the Memorial acquisition stemmed from the fact that when the acquisition was completed, Memorial Hospital, known to be in declining financial health at the time of acquisition, was actually in a much worse position then understood through the negotiation process. As a physician executive noted,

> "Now we actually know the true financial situation of Memorial, which is they are in a worse situation then we knew prior to that. It could have potentially changed my decision, but I don't think it would have changed what Care New England did. I still think it's a strategic move to have a presence in northern Rhode Island so it was more than financial."

More interestingly, there was a feeling that the decision was almost a mandatory one, given the level of competition in the state. As another physician executive noted,

> "I would do it again if we had to do it over simply because it did prevent Lifespan [largest competitor] from getting the family

> medicine practice. Although I think there are people who would not do it again."

This sentiment was largely true for all top leaders; when pressed, respondents said the Memorial acquisition decision was a good decision even if it would present future challenges.

This sentiment was broadly reflected on the top team; this was a strategic move that Care New England needed to make to execute its strategy. Thus, for purposes of testing, all decisions meet the criteria of being satisfying to the upper echelon of managers in the organization.

4.5.5. (RQ1): When strategic decisions are satisfying, is the strategic performance measurement system effective?

To test the strategic performance measurement system in enabling strategic decisions, the effectiveness of the strategic performance measurement system was examined. Interview responses to the question asking respondents to rate the overall system's effectiveness are presented in Table 4-8.

Table 4-8: Respondent Perspectives on Strategic Performance Measurement System Effectiveness[7]

Executive 1	*Effecive*-I think if it was a scale of 1 to 10, we'd be a 7 or 8.
Executive 2	*Somewhat Effective*--Revenues and Expenses, but not key expenses (labor)
Executive 3	*Somewhat Effective*--Financial moreso than quality and patient satisfaction
Executive 4	*Somewhat Effective*-I would say that we are probably farther behind the industry in terms of recognizing our need for recalibrating our measurement.
Executive 5	*Unknown*
Executive 6	*Somewhat Effective*
Executive 7	*Effective*-Based upon prior year's performance
Executive 8	*Somewhat Effective*-We don't have the exact data we want
Executive 9	*Somewhat Effective*-a system that allows us to track the health of an individual has not been built yet.
Executive 10	*Somewhat Effective*-Getting better but planning and budgeting are not aligned.
Executive 11	*Effective*-The measurement system is adequate, but there's no leading indicators.
Executive 12	*Somewhat Effective*-It's fair to good. Sometimes too much data but not actionable information or not enough information even to manage that
Executive 13	*Effective*-but it's too cumbersome and time consuming
Executive 14	*Somewhat Effective*-it's a work in progress.
Executive 15	*Somewhat Effective to Effective*-there's room for improvement in terms of timeliness of reporting and how often we're updating information.
Executive 16	*Somewhat Effective*-We've got too many initaitives.
Executive 17	

Respondents were asked to provide an assessment of overall performance measurement system effectiveness, which included not only the strategic performance measurement system but also the quality measurement system, the financial management system, the project management process as well as any measure that pertained to functional areas outside of finance such as human resources. The question was asked in this way because of the findings in Project 2, in which leaders, when interviewed, were unable to draw a distinction between non-strategic performance measures and strategic performance measures. Asking the question in this way enabled the researcher to ensure all measures were evaluated in terms of aggregate effectiveness. The response overall was “somewhat effective”

[7]All respondents but one were able to assess the overall performance measurement system. The executive who was unable to provide an assessment had not been with Care New England for a sufficient amount of time to evaluate performance.

from the top team. This rating was not surprising as the health care industry in general is known for lacking systems for accurate tracking and allocation of costs (Kaplan and Porter, 2011). Senior managers working in the industry openly acknowledge this is the case, and the participants in the study supported this view.

The Balanced Scorecard, however, earned better marks than the overall performance measurement system. The thoughts of one executive summed up the belief,

> "I would say that we were probably farther behind the industry in terms of recognizing the need to recalibrate our measurement. That said, I think that the senior team that has been assembled here does get the pressures of the industry and does get the dynamic nature of the industry we're in and I think we're paying attention to the right things on our Balanced Scorecard and metric-driven assessment."

And per the Care New England chief executive,

> "We're now in our third iteration of the Balanced Scorecard, and I think directionally that alignment is there. I mean a lot of it comes down to the actual initiatives and the actual metrics that you can monitor and measures quantitatively going forward.
>
> "I think the Balanced Scorecard has given us a well-rounded view of what we should be working on in response to the environment."

Based on the interview data, the strategic performance measurement system can be considered "somewhat effective." However, to further assess this finding, top-team responses were compared to questionnaire responses from the senior team. The findings are presented in Tables 4-9 and 4-10.

Table 4-9: Questionnaire Respondents' Assessment of Overall Performance Measure Effectiveness

Based on your knowledge, how effective is Care New England's overall performance measurement system (includes all measures CNE uses—financial, operational, clinical, quality, and Balanced Scorecard)?		
Answer Choices	Responses	Percentages

1 (Highly Ineffective)	0	0%
2	0	0%
3	0	0%
4	2	6.67%
5	2	6.67%
6	6	20%
7	7	23.33%
8	9	30%
9	3	10%
10 (Highly Effective)	0	0%
Don't Know	1	3.33%
Total	30	

Nineteen of the responses, or 73.3%, cluster on the 6th, 7th and 8th scale points. The weighted average of responses was 7, which would approximate a "moderately effective" senior team response. This finding is consistent with the top team's view that the strategic performance measurement system can be deemed "somewhat effective" in terms of overall effectiveness.

When the question asked the respondent to rate the effectiveness of the Balanced Scorecard, average responses improved but only modestly.

Table 4-10: Respondents' Assessment of Balanced Scorecard Effectiveness

Based on your knowledge, how effective is the Balanced Scorecard in terms of measuring organizational performance?		
Answer Choices	Responses	Percentages
1 (Highly Ineffective)	0	0%
2	0	0%
3	1	3.33%
4	0	0%
5	2	6.67%
6	7	23.33%
7	7	23.33%
8	8	26.67%
9	3	10%
10 (Highly Effective)	2	6.67%
Don't Know	0	0%
Total	30	

Again, 73.3%, cluster around the 6th, 7th, and 8th scale points and the weighted average was 7.2. This was not sufficient to merit a rating other than "moderately effective."

Both the interview data and the questionnaire data lead to the conclusions that the strategic performance measurement system—in this case the Balanced Scorecard—is viewed by the organization to be "moderately" or "somewhat effective" in terms of measuring strategic performance.

Considered in conjunction with strategic decision effectiveness—which was satisfying—these data call into question the role of the strategic performance measurement system in informing strategic decisions. The data indicate that highly satisfying decisions can be made even when the strategic performance measurement system is only somewhat effective. This suggests that the strategic performance measurement system does not play a central or direct role in informing strategic decisions. Strategic decision satisfaction will not be maintained in the model.

4.5.6. (RQ2) Given the strategic performance measurement system's effectiveness, is there strategic performance measurement clustering on critical environmental variables?

To explore strategic performance measurement clustering, the critical environmental variables affecting Care New England were identified. This was accomplished by asking interviewees what they believe are the leading causes of change within the industry. Each interviewee identified two to three causes, which are listed by executive in Table 4-11. The responses were summarized into major categories, listing the summary and frequency of responses that aligned. This finding is presented in yellow in Table 4-11. The top responses were distilled down to six critical variables: cost pressures, policy changes, demand for better value, payment reform, transparency, and consolidation/systemization. These categories were then used as the response points to a question that asked questionnaire respondents to rank the drivers of environmental change. Their responses confirmed the top six responses of the interviewees, although the order was slightly different. The pink box in Table 4-11 shows the questionnaire rankings of responses aligned to the interviewee summary.

Table 4-11: Respondent Perspectives on Critical Environmental Variables with Questionnaire Alignment

Executive	Variable 1	Variable 2	Variable 3	Summary	Responses	Survey Ranking
Executive 1	Cost Reimbursement	Consolidation	Technology Change	**Cost Pressure**	**8**	**First**
Executive 2	Affordable Care Act	Changes in Expectations of Consumers & Employers		**Policy Changes**	**7**	**Second**
Executive 3	Cost Pressures	Number of Uninsured		**Better Value**	**8**	**Sixth**
Executive 4	Cost Pressures	Private Equity		**Payment Reform**	**6**	**Fifth**
Executive 5	Regulation	Payor Demands	Competiton	**Transparency**	**4**	**Fourth**
Executive 6	Cost Pressures/Economics	Policy Chages	Transparency in Reporting	**Consolidation/Systemization**	**3**	**Third**
Executive 7	Economy	Technology	Federal Level Changes	Technology Change	4	
Executive 8	Payment Reform	Patient Information	Talent Shortage	Competition	2	
Executive 9	Regulatory Pressures	Transparency	Competition	Growing Uninsured	2	
Executive 10	Cost Pressures	Systemization	Demand for Better Value	Private Equity	1	
Executive 11	Payment Reform	Economics	Technology	Talent	1	
Executive 12	Cost Pressures	Transparency in Information	Policy Changes	Care Delivery	1	
Executive 13	Cost of Healthcare	Affordable Care Act	Demand for Better Value			
Executive 14	Healthcare Reform	Cost Pressures	Demand for Better Value			
Executive 15	Consolidation	Payment Reform	Demand for Better Value			
Executive 16	Technology	Care Delivery	Reimbursement			
Executive 17	Demand for Better Value	Cover the Population				

Although not in the same order of priority, the questionnaire confirmed the same six variables. For further analysis purposes, these six variables are considered the primary sources of environmental change for Care New England.

With the main environmental variables identified, the measures from the 2012 and 2013 Balanced Scorecard are aligned to each of the summarized variables driving change listed in the Summary column of Table 4-11. The alignment is found in Table 4-12. What can be seen is that for both 2012 and 2013, 72% and 70% of the strategic performance measures contained on the Balanced Scorecard align to the five critical environmental variables presented in yellow in Table 4-11—cost pressures, better value, policy changes, consolidation/systemization and payment reform. What this shows is that a majority of the measures contained it the strategic performance measurement system cluster on the critical environmental variables that top managers believe are driving change in their organization. Expanding the variable set to include technology and competition—critical change drivers identified by the top team—increases measure alignment to 85% and 83% for 2012 and 2013, respectively. With greater than 72% and 70% % of Balanced Scorecard measures

aligned to five critical environmental variables, the clustering of the strategic performance measures to critical environmental variables appears high. This indicates that Care New England has a significant clustering of strategic performance measures on critical environmental variables. Further, it suggests that the variable regarding measure alignment to critical environmental variables in the model should be included in the research without modification.

Table 4-12: Alignment of Critical Environmental Variables with Balanced Scorecard Measures

Critical Variables	2012 Measures	2013 Measures	2012%	2013%
Cost Pressures	Operting Margin (%)	Case Mix Adjusted Length of Stay (days)	23%	19%
	Cash to Debt Ratio (#)	Cost per Adjusted Discharge ($)		
	Days Cash on Hand (#)	Full Time Equivalents per Adjusted Occupied Bed (#)		
	Full Time Equivalents per Adjusted Occupied Bed (#)	Full Time Equivalents per Adjusted Occupied Bed (#)		
	Dollars Paid per Full Time Equivalent ($)	Operating Margin (%)		
	Days in Accounts Receivable (days)	Cash to Debt Ratio (#)		
	Contract Yield (%)	Contract Yield (%)		
		Days Cash on Hand (#)		
		Days in Accounts Receivable (days)		
	7	9		
Better Value	Framework Selected	BCBSRI Quality Metrics	23%	30%
	HCAHPS Top Box Score for Butler (%)	HCAHPS Top Box Score for Kent (%)		
	HCAHPS Top Box Score for Women & Infants (%)	HCAHPS Top Box Score for VNA(%)		
	HCAHPS Top Box Score for Kent (%)	HCAHPS Top Box Score for Women & Infants (%)		
	Kent Emergency Department Raw Score	Kent Emergency Department Raw Score		
	WIH OB Raw Score	WIH OB Raw Score		
	Achieve Quality Program Measures (Various)	Butler Hospital Likelihood to Recommend		
		Administration Simplification		
		Care Coordination		
		Quality Incentives		
		Rate of Increase		
		Transparency		
		Units of Service		
		New Collaborations Established (#)		
	7	14		
Policy Changes	Complete Assessment Report	Complete Assessment Report	13%	4%
	Staff Recruited (#)			
	Single Source for IT Services	Identify Health Needs Areas		
	Reporting Process in Place			
	4	2		
Consolidation/Systemization	Physicians (#)	Cases Referred with CNE	10%	13%
	Milestones on Strategic Partnership Strategy (#)	Council Success Rates		
	Governance Restructuring Completed	Clinically Integrated Network (%)		
		Affiliated Primary Care Physicians (#)		
		Key Partner in Behavioral Care Identified		
		Key Partner in Acute Care Identified		
	3	6		
Technology Change	Medicare and Medicaid Meaninful Use Incentives (%)	Medicare and Medicaid Meaninful Use Incentives (%)	10%	13%
	3	6		
Competition	Rhode Island Market Share (%)		3%	0%
	1	0		
Talent	HR Consolidation Complete	Manager Communication Rating	13%	17%
	Employee Engagement on Collaboration	Manager Respect Rating		
	Council Formed	Positive Change Rating		
	Agreement Signed with Brown	Ranking in U.S. New and World Report		
		Workplace Contribution/Positive Environment Rating		
		Physician Engagement Index		
		Fellowship Match Rate (%)		
		Written Board Exam Pass Rate (%)		
	4	8		
Payment Reform	Models Developed & Applications Submitted (#)	Programs Under Agreement (#)	3%	4%
		Infrastructure Implemented (%)		
	1	2		
Total Measures	30	47		

4.5.7. (RQ3) Given the strategic performance measurement system's effectiveness, are strategic performance measures present in significant numbers in critical environmental variable areas?

To explore the relationship between strategic performance measurement system effectiveness and measure number in critical environmental variable areas, data for the two largest uncertainty areas per the top-team interviews—cost pressures and better value—were examined. These variables were considered for three main reasons. First, the top management team and the senior team identified these two variables as the two most important environmental variables facing the organization. Second, both the absolute number and the percentage of strategic performance measures on the Balanced Scorecard identified in these two areas are high; cost pressures has nine measures constituting 19% of all strategic performance measures in 2013 and better value has 14 measures comprising 30% of all strategic performance measures for 2013. Third, external evidence indicates that these areas are, in fact, among the most significant challenges facing the U.S. health care system as described in the sections that follow.

4.5.7.1. Cost Pressures

The cost of health care in the United States has risen—and continues to rise—at a rate faster than inflation. In 2012, total health care spending in the United States rose to $2.807 trillion, for a cost of $8,948 per person. This reflects a 3.7% increase over the prior year according to Centers for Medicare and Medicaid Services (Martin et al., 2012). This number is expected to keep rising—a trend that has persisted for the past 50 years. The federal government and large payers are pushing delivery systems to streamline care and seek efficiency in the diagnosis and treatment of medical conditions.

4.5.7.2. Better Value

According to the Organization for Economic Cooperation and Development (OECD), the United States spends over two and a half times the OECD average on health care. In 2012, the United States spent $8,508 on health per capita versus the OECD average of $3,330. Unfortunately, Americans do not enjoy better outcomes for the

cost of their health care. Life expectancy in the United States is below the OECD average at 78.2 to 79.5. These statistics and many others like them have become common knowledge in the United States, and policy makers along with the citizenry are asking why the value of health care is so low.

Two sets of data were used to examine measure depth beyond what is already shown on the Balanced Scorecard: patient activity information (Table 4-13) and information from Care New England's quality dashboard (Table 4.14).

Table 4-13: September 2013 Detailed Patient Activity Information[8]

Care New England
Patient Activity Summary
Year to Date as of September 30, 2013

	Current Year Actual					Current Year Budget				
	Butler	Kent	WIH	KCVNA	Total	Butler	Kent	WIH	KCVNA	Total
Admissions/Discharges										
Adult and Pediatric	5,741	12,450	10,037	0	28,228	5,107	11,625	11,295	0	28,027
Kent Unit at Butler	0	950	0	0	950	0	1,041	0	0	1,041
Normal Newborn	0	971	7,669	0	8,640	0	903	7,600	0	8,503
Neonatal Intensive Care	0	94	1,199	0	1,293	0	93	1,163	0	1,256
Rehab	0	411	0	0	411	0	417	0	0	417
Total	5,741	14,881	18,905	0	39,527	5,107	14,079	20,058	0	39,244
Patient Days										
Adult and Pediatric	46,155	59,570	51,980	0	137,705	44,868	53,124	45,470	0	143,462
Kent Unit at Butler	0	6,792	0	0	6,792	0	9,852	0	0	9,852
Normal Newborn	0	2,460	20,655	0	23,115	0	2,351	20,997	0	23,348
Neonatal Intensive Care	0	7,293	21,964	0	29,257	0	903	23,287	0	24,190
Rehab	0	5,247	0	0	5,247	0	4,370	0	0	4,370
Total	46,155	81,362	94,599	0	222,116	44,868	70,600	89,754	0	205,222
Length of Stay										
Adult and Pediatric	8.04	4.79	N/A	N/A	5.44	8.78	4.57	4.02	N/A	5.13
Kent Unit at Butler	N/A	10.21	N/A	N/A	10.21	N/A	9.47	N/A	N/A	9.47
Normal Newborn	N/A	2.53	2.69	N/A	2.67	N/A	2.60	2.76	N/A	2.75
Neonatal Intensive Care	N/A	12.51	18.00	N/A	18.42	N/A	10.03	20.20	N/A	19.31
Rehab	N/A	12.77	N/A	N/A	12.76	N/A	11.92	N/A	N/A	11.92
Total	8.04	5.47	5.07	N/A	5.62	8.78	5.02	4.47	N/A	5.23
Deliveries	0	1,012	8,444	0	9,456	0	928	8,360	0	9,288
Inpatient Surgical Procedures	0	3,149	1,999	0	5,148	0	3,524	2,047	0	5,571

[8] Memorial Hospital is not included in this display as the unit was not integrated into system reporting at this point in time.

Table 4-14: 2013 System Quality Dashboard

Care New England Quality Dashboard - FY13

Facility	Measure	Current Results	Target Goal	Target Status	Qtr***	DD*	Trend
Process of Care							
Kent	Catheter Associated UTI						
WIH	Pre-Op Antibiotics						
BH	HBIPS 7 Discharge Plan						
VNA	Timely Care						
Outcomes of Care							
Kent	CLABSI						
Kent	Med/Surg Falls						
WIH	CLABSI NICU						
WIH	BW categ w/zero infect						
BH	HBIPS 5 Med Justif						
Patient Experience							
Kent	ED Pat Sat						
Kent	CAHPS: Kent						
WIH	OB Pat Sat						
WIH	CAHPS: WIH						
BH	PG: Def Recommend						
VNA	Staff talked re: Meds						
Transitions of Care							
Kent	Offer follow-up appt						
WIH	Sched OP follow-up						
BH	Contact Treating Phys						
Readmissions							
Kent	30 day Overall						
WIH	42 day OB						
BH	30 day Medicare						
VNA	30 day rehosp. Rate						
BCBSRI Quality Metrics							
CNE	BCBSRI P4P						

* DD = Desired Direction
** includes data for Jan & Feb
*** Qtr column indicates FY13 quarter unless noted with FY12

What the data show is a significant performance measure detail—beyond what is listed on the Balanced Scorecard—in these critical areas. The patient activity information highlights admission/discharge information, patient days detail, and length of stay data for all locations at month end. This information is captured daily and reviewed monthly by each hospital executive as well as the CFO. Per the system's 2013 Balanced Scorecard, two of the most critical measures in the cost pressures area are case mix adjusted length of stay and cost per adjusted discharge. The main drivers of these measures are shown in Tables 4-13. These were clearly key areas to be monitored by the CEO,

> "High-level FTE [full time equivalent employee] indicators for adjusted occupied bed, cost per FTE is another high-level indicator. If your FTEs per adjusted occupied bed are going down, you know it's within budget, and if your costs per FTE are going down as well, those are

> the two figures at the top of the organization. You're going to have successful year if you're managing these indicators across the system."

And as the data show, these measures were in fact looked at across the system. Another critical area was the quality performance of the system, a major issue in the United States and for Care New England especially. The contract with Blue Cross/Blue Shield of Rhode Island had precise quality targets written into it; it was evident the agreement needed to be managed carefully. Further, quality was one of the organization's major strategic thrusts. Per one physician executive,

> "The public and insurers want to have us deliver great quality health care at a low cost, and we weren't doing it. We have wild variation in terms of our quality within Care New England. So the whole organization has become bit more of, 'We'll have no credibility if we can't fix this.'"

What the data show is significant numbers of detailed measures beyond what is listed on the high-level strategic performance measurement system in the areas of critical environmental variables. The data here lead to the finding that the strategic performance measurement system has significant numbers of performance measures in place for the critical environmental variable areas. It suggests that the variable regarding measure clustering around critical environmental variables be included in the model without modification.

4.5.8. (RQ4) Given the strategic performance measurement system's effectiveness, is strategic performance measurement system use high?

To assess strategic performance measurement use, the frequency with which the top team met to discuss the Balanced Scorecard was examined. Meeting frequency was selected as a proxy of use for several reasons. First, the strategic performance measurement system is a key tool for the top team to implement the organization's strategy. Gauging occasions of use provides a good indicator of management attention to strategy execution. Second, use evidence shows that the Balanced Scorecard is reviewed typically monthly or quarterly in most organizations (Kaplan and Norton, 1996c). Thus, a use standard has been established that use at Care New England can be compared to. Breadth of use as a proxy for overall use in the organization was not selected because the composition of the top team included

representatives from all units; it was reasonable to conclude that use by the top team would drive use in subordinate units and thus would be an appropriate overall proxy for organization use, both horizontally and vertically.

To test use, agendas for the top team's meetings were gathered and analyzed for the calendar year 2013. That information is presented in Table 4-15.

Table 4-15: Top-Team Executive Meeting Topics 2013

Date	Topics
4/5/13	Baldrige
	President's Update
	Surgery--Volume and Trends
	Radiation Therapy at CNE
	Finance Update
	Hire and Termination Reports
	Draft Natural Disaster/Storm Policy
	Butler Union Settlement Update
	Home Health and Hospice Referral Patterns
3/15/13	Baldrige
	President's Update
	Compensation, 2013
	The Forster G. McGaw Prize for Excellence in Community Service
	Surgery--Volume and Trends
	Robotics
	Finance Update
3/1/13	President's Update
	RISNA Annual Nightingale Gala
	Providence Business News-Best Places to Work
	Finance Update
	Consent Agenda
	Council Updates
2/1/13	Council SharePoint Site
	FY13 Balanced Scorecard in CNEtics Display
	President's Update
	Johnson & Wales Physician Assistant School
	Harvard School of Public Health Physician Leadership Development
	Annual Report
	Quest for Excellence Conference
	ELT/SMT Format
	Lewin Hospital Bed Need Study Update
	Consent Agenda
	Council Updates
1/18/13	Baseline Baldrige Assessment
	President's Update
	Memorial On Boarding Team
	FY13 Management Team Goals
	Consent Agenda
	Council Updates
1/4/13	Landmark OB
	Monthly Board Report via Council Model
	Consent Agenda
	Council Updates

Date	Topics
12/20/13	President's Update
	Financial Update
	Transforming Together (Baldrige)
11/1/13	President's Update
	Memorial Hospital Update
	Finance Report/Update
	Update Mobile Devices
	Balanced Scorecard FY13 Performance Review
	Balanced Scorecard FY14 Measures and Targets
10/4/13	Presidents Update
	Memorial Hospital Update
	Finance Report/Update
9/6/13	President's Update
	Balanced Scorecard, FY14 Proposed Measures
	Finance Update
	Memorial Hopsital
	AHA McKesson Quest for Quality Prize
8/16/13	President' Update
	Transforming Together (Baldrige)
	Balanced Scorecard
7/19/13	President's Update
	MIRI Integration Update
	Finance Update
	CNE Legal Department Presentation
	Pateint Family Centered Care
6/21/13	Category 5 (Baldrige Workforce) Work Plan
	Finance Update
	Memorial Integration
	Balanced Scorecard Performance Review--Q1 & Q2
	President's Update
6/7/13	Integration Planning Update
	Finance Update
	2013 Capital Budget
	Managing Strategic Initiatives (Balanced Scorecard)
	President's Update
	FY 13 Incentive Plan Projections
5/17/13	Baldrige Update
	Integration Planning Update
	President's Update
	Corporate Services Council Charter
	Current Care
	Finance Update
4/19/13	GE-MERS Disposition
	Leadership Rhode Island
	Council Updates
	Operating Unit Updates
	90 Day Gut Check Exercise

Items in red are those related to the Balanced Scorecard; items in blue reflect topics related to aspects of the Balanced Scorecard, such as goals, financial performance updates, and initiatives. There were 7 occasions during the year when the Balanced Scorecard was discussed directly during the top-team meeting. At 33 other times

the top team discussed topics related to the Balanced Scorecard in addition to the 8 occasions where the Balanced Scorecard was specifically engaged in. A visual scan of the agenda items shows that the Balanced Scorecard—while discussed frequently—was only reviewed twice to determine overall strategic performance. This use can be considered infrequent; by comparison evidence regarding Balanced Scorecard use indicates performance review held by top teams, on average, occur quarterly or monthly (Kaplan and Norton, 1996c)

To further examine the use of the Balanced Scorecard within the organization, data from the senior team questionnaire were explored. These findings are presented in Table 4-16.

Table 4-16: Questionnaire Respondents' Assessment of Balanced Scorecard Use

From your perspective, how frequently is the Balanced Scorecard reviewed by leaders at Care New England?		
Answer Choices	Responses	Percentages
1 (Not Frequently)	0	0%
2	0	0%
3	0	0%
4	1	3.33%
5	6	20%
6	2	6.67%
7	2	6.67%
8	6	20%
9	4	13.33%
10 (Very Frequently)	7	23.33%
Don't Know	2	6.67%
Total	30	

The responses show the highest density on scale points 5, 8, and 10. The weighted average of responses was 7.6, which would approximate a "moderately frequent" to "frequent" response.

What the data show in these two examinations is that use of the Balanced Scorecard is not high, at least in the diagnostic sense. Strategy reviews were held only twice during the annual period observed—June 21, 2013 and November 1, 2013. Data from the questionnaire indicate that the second tier of managers varied on their views regarding how often the Balanced Scorecard was reviewed. Average use was perceived as "moderately frequent." The expectation of use was quarterly at a

minimum or monthly—consistent with common use practices. Care New England's use was lower. However, Table 4-15 does show other use characteristics. The Balanced Scorecard was the topic of discussion frequently and content relating to the set of objectives and measures was discussed with considerable frequency. One or more topics pertaining to objectives or measures on the Balanced Scorecard were discussed in 10 of 12 months. Two of the three major decisions—Baldrige application and Memorial acquisition—were discussed six and eight times, respectively. So while diagnostic use of the strategic performance measurement system is not high, use of the Balanced Scorecard to focus on key decisions and key action is. This suggests that views on use are impacted by frequency of use and that the concept of use itself may need to be reconceptualized. This finding suggests that the variable regarding strategic performance measurement system use should be maintained in the model, but needs to be expanded to incorporate the concept of interactive use.

4.5.9. (RQ5) Given the strategic performance measurement system's effectiveness, is management attention to critical environmental variables high?

The final assessment is the evaluation of the extent to which the top team is directing their attention toward the critical environmental variables. To gauge the level of management attention, topics the CEO communicated as part of his weekly newsletter were examined. "Carenews" is distributed to all employees electronically on a weekly basis. The document has several purposes: to maintain awareness of goings-on throughout Care New England Health System, to recognize important achievements—among the clinical staff in particular, to encourage employee participation in various community and volunteer activities, and to highlight matters of import to the chief executive. The CEO's letter, as might be expected, starts each newsletter. A sample edition is included at Section 6.9. Six months of published weekly newsletters (from July 1, 2013, to December 30, 2013) were examined. From each newsletter, topics were extracted by heading and placed, by week, into a table. Each topic was then reviewed, coding it to one of the previously identified critical environmental variables in instances where it matched. The data summary is provided in Table 4-17.

Table 4-17: Care New England Newsletter Summary

Date	CEO Topic	Alignment to CV
12/30/13	Balanced Scorecard, Destination Metrics (2018), Long-Range Goals, 22 Initiatives	All
12/23/13	Patient Feedback on How CNE Makes a Difference	Transparency
12/16/13	Seven Habits Discussion, Reminder of Monthly Brown Bag Lunches at each OU	-
12/9/13	VNA of Care New England Candlelight Ceremony	-
12/2/13	CNE Progress Report: Memorial Hospital, CNE Way, Robotic Surgury, W&I Center of Excellence Designation	Better Value/Consolidation
11/25/13	Seasonal Gratitude, Employee Sentiments	-
11/18/13	What it Takes to Become A Leader, CNE Leadership Seminar Commencement	-
11/12/13	CNE Together Make It Better Campaign (Substance Abuse), Advancing Public Health	Policy Changes
11/4/13	Memorial Hospital of RI Named a 2013 Top Perfomer on Key Quality Metrics by Joint Commission (Heart Attack, Heart Failure, Pneumonia, Surcial Care)	Better Value/Consolidation
10/28/13	Influenza Vaccination Status for All Healthcarer Workers in RI, Flu Vaccine Information	-
10/15/13	Community Needs Assessment Goals: Mental Health/Substance Abuse, Heart Disease, Diabetes	Policy Changes
10/7/13	Connie Howe New Role, W&I Achievements Under Connie's Leadership, Mark Mercantano as Acting President	-
9/30/13	Opening of Reviewview Building at Butler Hopsital, Community Health Needs Assessment Strategy, Second Annual CNE Behavioral Health Quality Conference	Better/Value
9/23/13	Annual CNE Service Awards and 15 Years of the CARE Awards for outstanding contributions for improving customer satisfaction	Transparency
9/16/13	Together Make it Better Campaign, CNE Talks Health	-
9/9/13	Board Goal of Pursuing a National Quality Award--Baldrige Choice; Transforming Together Campaign, Listening Campaign	Cost Pressures/Better Value
9/3/13	Signing of Memorial Hospital On Boarding Agreement, Creating a Leading Edge Primary Care System, Develoment of a Patient Centered Medical Home	Consolidation
8/26/13	Appointment of Dr. Maureen Phipps, MD, MPH as the Chair of Dept. of Obstetrics and Gynecology at Brown University	-
8/19/13	Transforming the Future of Healthcare: Discussion of shared Values, Annual Cultural Assessment	Transparency/Policy Changes
8/13/13	Bundled Groups of Measures to Reduce Central Line Infection (CLABSI), Connie Howes Appointment to AHA	Better Value
8/5/13	Affordable Care Act, Health Insurance Exchange in RI, legislative changes, CNEs aim of providing value for customers--best quality at a fair price	Policy Changes
	Improvement on Key Productivity Measures, Building a new System of Care--improving patient experience, improving quality and lowering cost.	Better Value
7/29/13	Partnering with Affinity Group at Kent and Alliance at Women & Infants, reltaionshiop of the Providence Center, agreement with RI Primary Care Physicians Corp.	-
7/22/13	Rhode Island Quality Institute Report, Health Information Exchange, CurrentCare Electronic Information Exchange Enrollment Numbers 11,186	Better Value/Policy Changes
7/15/13	Description of the CARE Awards: Excellence in Customer Satisfaction, World Class Workforce Award, Future Vision Award, People Choice Award	Transparency/Better Value
7/8/13	Announcement of CNE Women's Health Council and Associated Events	-
7/1/13	State Approval of Memorial Hospital Acquisition, Integration Information	Consolidation

The analysis shows that 17 of the 26 newsletters included topics that pertained to one or more of the critical environmental variables identified. The topics cluster around "better value" and "consolidation"; however, policy changes are regularly communicated through the newsletter as well.

To further examine the management's attention, questionnaire data were examined that specifically asked the senior team to provide their view on management's attention to critical variables. The responses are included in Table 4-18.

Table 4-18: Questionnaire Respondents' Assessment of Management Attention

From your perspective, please rate how focused senior management's attention is on the major drivers of environmental change?		
Answer Choices	Responses	Percentages
1 (Highly Ineffective)	0	0%
2	0	0%
3	0	0%
4	0	0%
5	1	3.33%
6	3	10%
7	10	33.33%
8	5	16.67%
9	4	13.33%
10 (Highly Effective)	7	23.33%
Don't Know	0	0%
Total	30	

The responses show the highest density on scale points 7 and 10. The weighted average of responses was 8, which would approximate a "focused" response. Thus, senior managers from throughout Care New England believe that the top team is focused on the critical drivers of environmental change. The internal communication assessment via the CEO's letters indicates the same. The data indicate that management's attention to critical environmental variables is in fact high. Relative to the model, it suggests that management attention to critical variables warrants inclusion in the research model.

4.6. Findings and Discussion

The purpose of this study was to examine the model presented in Figure 4-1. The model was developed from an exploratory study of seven firms from within the security software industry; the intent in this study was to determine if the propositions underlying the model would replicate in a different, but equally turbulent setting—the U.S. health care industry. To accomplish this, five research questions were developed and explored using data from a single in-depth case analysis. It is important to keep in mind that the purpose was not to test the strength of the relationship but rather to determine whether or not each independent concept merits inclusion in a final research model given the presence of the dependent concept. The summary findings are presented in Table 4-19.

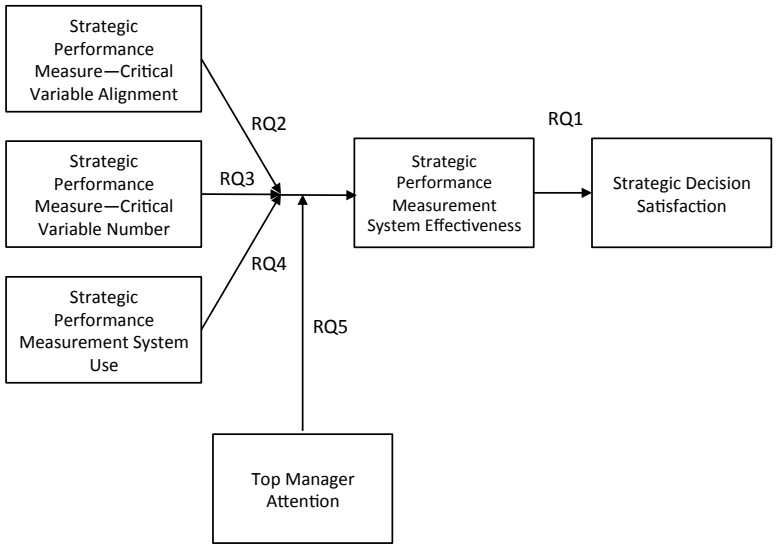
Table 4-19: Research Questions and Findings

Research Questions	Study Findings
(RQ1) When strategic decisions are satisfying, is the strategic performance measurement system effective?	When decisions were satisfying the performance measurement system was not effective—it was somewhat effective. This suggests that the link between strategic performance system effectiveness and decision satisfaction is weak and/or indirect. **The variable regarding strategic decision satisfaction is removed from the model.**
(RQ2) Given the strategic performance measurement system's effectiveness, is there strategic performance measurement clustering on critical environmental variables?	When the strategic performance measurement system was somewhat effective, there was clustering of strategic performance measures on critical environmental variables. **The variable regarding measure alignment to critical environmental variables is included in the research model without modification.**
(RQ3) Given the strategic performance measurement system's effectiveness, are strategic performance measures present in significant numbers in critical environmental variable areas?	When the strategic performance measurement system was somewhat effective, performance measures were present in significant numbers in critical environmental variable areas. **The variable regarding strategic performance measure clustering in critical environmental variables is included in the model without modification.**
(RQ4) Given the strategic performance measurement system's effectiveness, is strategic performance measurement system use high?	When the strategic performance measurement system was somewhat effective, strategic performance measurement system use was low, relative to use conventions. **The variable regarding strategic performance measurement system use is included in the model with modification pertaining to the addition of interactive use.**

(RQ5) Given the strategic performance measurement system's effectiveness, is management attention to critical environmental variables high?	When the strategic performance measurement system was somewhat effective, management attention to critical environmental variables was high. **The variable regarding management attention to critical environmental variables is included in the research model without modification.**

Three of the research questions were supported by the findings within the case: RQ2, RQ3 and RQ5. One research question was not: RQ1. One of the research questions was included but was modified: RQ4. In the following subsections the findings are interpreted in the order of presentation in Figure 4-2.

Figure 4-2: Model of Strategic Performance Measurement in Turbulent Environments with Research Questions



4.6.1. (RQ1) When strategic decisions are satisfying, is the strategic performance measurement system effective?

The finding for RQ1 was that when the strategic decisions were satisfying, the strategic performance measurement system was not fully effective—it was partially effective. This finding leads to the conclusion is that the strategic performance measurement system is not a direct contributor to strategic decision satisfaction or more broadly, strategic decision-making. Franco-Santos et al. (2007) note that a strategic performance measurement system plays five critical roles: (1) measure performance, (2) manage strategy, (3) communicate, (4) influence behavior, and (5)

enable learning and improvement. In their analysis of 17 different papers, by 17 separate researchers, they found only two that include in their definition of business performance measurement systems a role for decision-making. Further, they do not offer decision making as one of the five critical roles performance measurement systems play. A role that performance measurement systems do play, however, is providing information—which is what the Balanced Scorecard does in this setting does, but not to a fully satisfying degree. As noted in Table 4-8, some of the executive responses to performance measurement system effectiveness highlight significant deficiencies within the system:

> "We don't have the exact data we want."
>
> "The measurement system is adequate, but there's no leading indicators."
>
> "It's fair to good. Sometimes too much data but not actionable information."
>
> "There's room for improvement in terms of timeliness of reporting."

These responses indicate that the Balanced Scorecard is not fully effective from the top team's view. Also, analysis of the information used by those executives in making the strategic decisions discussed revealed scant evidence that the information stemmed directly from the strategic performance measurement system. When asked as part of the interview what data were used to inform the strategic decisions, the executives' responses indicated strongly there were no data that were used directly,

> "Specifically any of our own data suggesting that we move forward with the model? I can't say that I looked at any of that." [Baldrige decision]
>
> "What accounts for Baldrige? I don't know of anything in particular" [Baldrige decisions]

> "No. I don't remember that at all. I don't remember looking at that, we just knew we needed improvement quickly and said, 'Listen the Baldrige framework would help us with this.'" [Baldrige decisions]

When data were used, it was indirect use or information that was based on a more general understanding of organizational performance.

> "I would say there was one thing that perhaps was discussed as pertaining to the Baldrige framework: patient satisfaction scores across the system, which were poor. But beyond that I can't think of anything else." [Baldrige decisions]

Evidence shows no direct link between organizational data from the strategic performance measurement system and strategic decision-making. Consistent with other views, the information from the Balanced Scorecard set the stage for managerial search actions, which often led to the acquisition of unique information solicited expressly for decision-making purposes.

Simons (1995) notes that the Balanced Scorecard is classic diagnostic control system: "Kaplan and Norton (1992) propose a systematic way of analyzing critical performance variables and measures associated with intended strategies. In their analysis, diagnostic control measures are grouped into four categories: financial measures, customer measures, internal business measures, and innovation and learning measures" (Simons, 1995, p. 68)**.** Diagnostic control systems are by their very nature focused on implementing critical performance variables associated with an intended strategy—this is the case at Care New England. And while a diagnostic control system can become an interactive control system via enhanced management attention, the Balanced Scorecard did not receive sufficient attention from the CEO to be characterized as such when traditional performance reviews were considered. The Balanced Scorecard remains a "somewhat effective" diagnostic control mechanism within the organization. It must then be concluded an fully effective strategic performance measurement system is not a prerequisite of effective strategic decision-making.

4.6.2. (RQ5) Given the strategic performance measurement system's effectiveness, is management attention to critical environmental variables high?

The finding for RQ5 was that even when the strategic performance measurement system was only partially effective, there was still a strong management attention to critical environmental variables. This finding was different from what was expected given the muted effectiveness of the system—it suggested limited or unfocused management attention. However, the questionnaire information regarding management attention coupled with the topics in the CEO's communications showed a strong focus on the major forces driving change within Care New England's environment. What this indicates is that top management is, in fact, attuned to the greatest uncertainties facing the organization. More important, the contributor to strategic performance measurement systems dissatisfaction is not a function of management's attention to critical variables—it must be another concept. The conclusion here is that the appropriate management attention on critical environmental variables is an essential element of strategic performance system effectiveness.

4.6.3. (RQ2) Given the strategic performance measurement system's effectiveness, is there strategic performance measurement clustering on critical environmental variables?

The finding for RQ2 was that even when the strategic performance measurement system was only somewhat effective, there was still significant clustering of strategic performance measures on critical environmental variables. Again, this finding was different from what was expected given the partial effectiveness of the system; the expectation was there would be limited clustering on critical environmental variables. However, the moderating concept in this model is management attention, which was high.

In all cases, management is the primary architect and consumer of the performance measurement system and its information. If the system is not meeting the needs of the business, it is a top team's responsibility to alter the system so it produces the information needed. At Care New England, the CEO was clear regarding this progression of performance measurement maturity. When asked about the performance measurement system's effectiveness upon his arrival, his view was unambiguous,

> "Ineffective. Today it's effective, but I wouldn't say it's highly effective. Directionally we're doing a much better job managing."

And he attributed much of the focus to implementation of the Balanced Scorecard.

> "You have to appreciate that I used the Balanced Scorecard for nine years, so you go through this evolution… We're now in our third iteration and I think directionally the alignment is there."

His focus on metrics and key quantitative indicators was apparent and, per his own view, was a significant departure from his predecessor whose strategy was about driving up negotiated reimbursement rates, not managing the organization for overall performance. The CEO's awareness of the drivers of change and his instituting the Balanced Scorecard drove the organization toward a clearer focus on vision, metrics, and overall strategic performance. Again, the contributor to dissatisfaction with the strategic performance measurement system is not a function of strategic performance measurement clustering—it must be another concept. The conclusion here is the alignment of strategic performance measures on critical environmental variables is a key element to overall strategic performance system effectiveness.

4.6.4. (RQ3) Given the strategic performance measurement system's effectiveness, are strategic performance measures present in significant numbers in critical environmental variable areas?

The finding for RQ3 was that even when the strategic performance measurement system was only partially effective, strategic performance measures were still present in significant numbers in critical environmental areas. This finding was again different from what was expected given the muted effectiveness of the system, but it is what was expected from a review of literature.

Eisenhardt (1989b) notes that in high-velocity environments managers place a premium on real-time operational and competitor information. Information from the quality system and the financial system—two of the most critical uncertainty areas—indicated the top team was indeed receiving real-time information with high frequency. While there were concerns that the Balanced Scorecard did not fully produce the all the measures that top managers wanted, sufficient data are present to show that in areas of uncertainty adequate information was provided. The contributor to dissatisfaction with the strategic performance measurement system is not a function of strategic performance measurement number—it is another concept. The conclusion here is that the number of strategic performance measures

aligned on critical environmental variables is another vital element of overall strategic performance system effectiveness in this environment.

4.6.5. (RQ4) Given the strategic performance measurement system's effectiveness, is strategic performance measurement system use high?

The finding for RQ4 was that when the strategic performance measurement system was partially effective, strategic performance measurement system use was low. When the data were examined initially, there were difficulties reconciling the findings from the model testing with expectations based on publish usage rates. But further evaluations and revisits to the literature made it possible to resolve the conflicting views.

Based on the interview data presented in Table 4-15: Top Team Executive Meeting Topics 2013, there is minimal evidence that the Balanced Scorecard is in use as intended by the concept creators. The standard review frequency for the tool is quarterly or, more typically, monthly. Over the course of 2013, the Balanced Scorecard was reviewed only twice for purposes of assessing performance. Performance reviews typically focus on enabling discussions pertaining to variances between planned and actual performance. As Simons (1995) points out, diagnostic control systems require investment of management attention in three instances: (1) setting and negotiating goals, (2) receiving updates and exception reports, and (3) following up on significant exceptions. Personal observation of one Care New England performance review and feedback from the other revealed that the reviews were short and deviated from the three-step description provided by Simons. Detailed questions were not asked regarding actual performance and performance variances. For many of the measures, no data were available and conversation focused largely on actions being taken by the executive assigned responsibility for the measure being discussed. Observations of use were not consistent with the questionnaire respondents, who noted that the Balanced Scorecard review level was on average "frequent."

This view of use reflects consistency with diagnostic use as defined by Simons, where a goal is set and a measure is selected to quantify performance that then serves as a basis on which to evaluate whether or not performance has been achieved. However, the use of the Balanced Scorecard in this instance—at least at the time of the case—was more consistent with interactive control system use as defined by Simons. Top leaders engaged in discussions of risk or uncertainty areas in ways that

enabled ongoing dialogue about areas of interest to the CEO. Further, the objectives from the Balanced Scorecard were used as the basis for discussions with councils of executives and physician leaders working on like matters from across the organization. In addition to discussion of risks and uncertainties as part of the top management team meetings, the CEO would routinely sit in on cross-organizational council meetings and engage members in discussions around key areas where performance needed to improve. In many cases, actions were emphasized more than performance measurement information. But the CEO's routine presence at the council reviews signaled to the organization via his involvement that councils and their agendas were the main interactive control forum. This explains why strategic performance measurement system use—in the diagnostic sense—was low and satisfaction with the strategic performance measurement system did not enjoy the highest marks in terms of effectiveness. Respondents felt as though they were focusing on the right areas; however, they were not able to collect the data they needed. Table 4-20 presents the alignment of Balanced Scorecard objectives to critical environmental uncertainties for 2012 and 2013.

Table 4-20: Balanced Scorecard Objective—Critical Variable Alignment

2012	Critical Variables	2013	Critical Variables
Enhance Collaboration and Clinical Integration Across CNE in Priority Program Areas		Foster Collaboration and Integration	Consolidation/Systemization
Use the Pursuit of a National Quality Award to Transform the System Into a National Leader	Better Value	Deliver Best in Class Qulity	Better Value
Create a Culture of Excellence to Atract and Retain Top Caliber Staff	Talent	Create a Culture of Excellence	Talent
improve Patient Experience of Care	Better Value	Give the Best Patient Experience	Better Value
Improve Quality by Achieving BCBSRI Agreement Quality Metrics	Better Value	Improve Publc Health	Policy Changes
Continue to Enhance IT Infrastructure to Support Clinical Excellence, Effective Care Management and Cost Effectiveness	Technology Change	Improve Health	Policy Changes
Work Collaboratively with Public and Community Health Partners to Improve the Health of the Public	Policy Changes	Deliver Best Value	Better Value
Ensrue that Sufficient Primary Care Physicians are Aligned with CNE for Management Care Contracting/Care Management	Consolidation/Systemization	Improve Care Coordination	
Unify Community-Based Services Support Across CNE	Policy Changes	Build Execution/Transformation Skills	
Develop New Models of Collaboration, Cooperation, and Coordination of Care with Physicians	Policy Changes/Better Value	Create Positive Work Envrionment	Talent
Create System Development Plan	Consolidation/Systemization	Ensure Sufficient Primary Care Physicians are Aligned with CNE	Consolidation/Systemization
Maitain Inpatient Market Share	Competition	Implement New Models of Payment	Payment Reform
Strentghten CNE Research Infrastructure		Be a Great Place to Practice	Policy Changes
Strengthen Teaching Programs	Talent	Develop the Continuum of Care	Consolidation/Systemization
Operating Margin	Cost Pressures	Develop Strategic Partnerships	Consolidation/Systemization
Credit Rating	Cost Pressures	Grow Research Programs	
Efficiency and Effectiveness	Better Value/Cost Pressures	Strengthen Teaching Excellence	Talent
Create Unified Governance	Consolidation/Systemization	Academic Research Preeminence	
		Improve Research with External Organizations	Better Value
		Strengthen IT Infrastructure	Technology Change
		Improve Global Payment Infrastructure	Payment Reform
		Reduce Cost Position	Cost Pressures
		Manage Full Time Employees	Cost Pressures
		Grow Operating Margin	Cost Pressures
		Drive Operating Cash Flow	Cost Pressures

The table shows close alignment between critical environmental variables and strategic objectives. This suggests that management's use of the Balanced Scorecard is oriented toward objective discussion more so than measure review. The continual

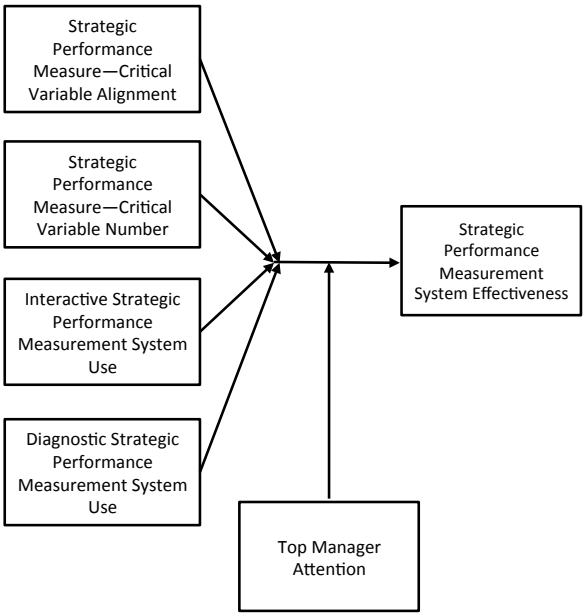
reinforcement and discussion of key objectives at the executive, council, and even organizational level indicates that use of the objectives interactively. This explains why the top team views the tools as not fully effective, whereas the senior team sees it as effective; it is not fully effective as a diagnostic control system, but is effective as an interactive one.

4.7. Conclusion

This research set out to answer the basic question: *how do firms in turbulent environments measure strategic performance?* The study tested a model of strategic performance measurement in the health care industry that had been previously developed from study of seven firms in the technology industry for purposes of replicating the functioning of the model in a different—but equally turbulent—environment.

Based on an in-depth case study of a large health care system, the findings of the research suggest that strategic performance measurement system design and use are strongly influenced by top management attention and behavior. In the case of Care New England, the CEO's long-standing experience with the Balanced Scorecard and his focus on selected strategic objectives and actions drove an extensive and interactive use of the Balanced Scorecard. Further, the effectiveness of the strategic performance measurement system is governed by the orientation of measurement on critical environmental variables, the number of measures focused on critical environmental variable areas, and the use of the same system in both a diagnostic and interactive manner. These concepts are presented in Figure 4-3.

Figure 4-3: Updated Model of Strategic Performance Measurement in Turbulent Environments



Previous research indicates that top-team integration and CEO orientation have a measurable impact on firm orientation and ultimately performance (Ocasio, 1997; Sims, et al., 2005). In this study, top-manager attention played a significant role in the design and use of the strategic performance measurement system. Consistent with previous research, measure design was focused on and constructed in-depth around critical environmental variables (Eisenhardt, 1989b). Further, the use of the system was both diagnostic and interactive in nature consistent with Simons's Levers of Control framework (Simons, 1995). Of note in this study are two findings: first, strategic decision-making is not a primary purpose of the strategic performance measurement system, a finding different from previously published literature (Merchant and Otley, 2006); second, not only can a single performance measurement system be used interactively and diagnostically, but also different elements of the system can be used for different purposes. Tuomela (2005), in his study of how the Balanced Scorecard was used to implement a new strategy, found that review of measures could be both interactive and diagnostic in nature, facilitating single- and double-loop learning (Argyrols, 1976). In this study, the same was true but more interestingly, other elements of the strategic performance measurement system—namely, strategic objectives—orient the top team toward strategic uncertainties that then are managed through ongoing dialog and

communication. Thus, orientation of the top team on critical objectives associated with uncertainty and recurring discussion of those objectives provides the top team with a mechanism to effectively manage the most challenging uncertainties facing the organization.

4.7.1. Theoretical Contribution

Novel research, such as cased-based hypothesis testing, in a new setting—a turbulent environment—does not necessarily constitute a contribution to theory; what does qualify are refinements and suggestions that provide a new way to approach a preexisting theory. As Whetten (1989) states, "Theorists need to learn something new about the theory itself as a result of working with it under different conditions. That is, new applications should improve the tool, not merely reaffirm it's utility" (Whetten, 1989, p. 493). This research provides a contribution to two frameworks—Simons's Levers of Control and Kaplan and Norton's Balanced Scorecard (Simons, 1995; Kaplan and Norton, 1996a).

Per Simons (1995), "Management control systems are the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities" (Simons, 1995, p. 5). In his levers of control framework, he notes that management control systems can be used either diagnostically or interactively, depending on how the top managers choose to use it. Reviewing performance variation alone makes a system's use diagnostic; engaging in dialogue and in-depth discussion pertaining to the information provided by the system causes it to become interactive. But a strategic performance measurement framework—Simons notes—cannot be used for both at the same time. And while Tuomela (2005) suggests that the Balanced Scorecard can be used both diagnostically and interactively, he focuses on different uses of the same performance measures.

This study found that the strategic performance measurement system—in this instance the Balanced Scorecard—was used both diagnostically and interactively, not by focusing on using the measures differently, but rather by focusing on using different components of the framework differently. Strategic objectives with the framework were developed which were aligned with critical environmental variables. Then, measures associated with the objectives were developed and used diagnostically—to monitor where the planned strategy was being successfully implemented and where it was deviating from anticipated performance. At the same time, the objectives served as a means to engage in further discussions

regarding critical risks and uncertainties. In some cases, measures existed for the objectives being discussed; in other instances, they did not. This makes sense given that the very nature of an uncertainty implies that it cannot be directly or easily measured. Dialogue in areas of uncertainty is more open-ended and qualitative, and, as Simons (1995) himself points out, more the basis of managerial perception than anything else (Simons, 1995, p. 95). But what is unique about this case is that top managers did not choose between using the Balanced Scorecard as either a diagnostic system or an interactive one—they unwittingly used one device for both purposes. This behavior is consistent with what is known regarding how managers behave when they lack the required information during task performance—in this case executing strategy: the more information required as the task is taking place, the more information needed and the more managers will continue their search for additional information during task execution (Galbraith, 1973). This research suggests the same strategic performance measurement system can be used to manage current state requirements and to monitor the future uncertainties where up-to-date and current information is continually needed.

4.7.2. Managerial Contribution

This research makes important contributions not only to theory, but also to management practice.

First, it underscores the importance of focusing management attention on critical uncertainty areas when designing a strategic performance measurement system. Consistent with the definition of management control systems by Simons (1995), managers use management control systems to maintain or alter patterns of activity. While it is essential to manage planned performance, it is more important in a turbulent setting to manage critical uncertainties and risks given their potential for undermining the business. Accomplishing this begins with management's orientation on those uncertainties. The finding here underscores the importance of management's role not only in understanding the source of uncertainties, but also in designing their performance measurement system to maintain focus on them.

Second, the findings here—consistent with the aim of the study—provide insights for top managers and their teams regarding how to use strategic performance measurement systems in turbulent environments. When designed with an orientation on critical environmental variables, performance discussions can then be focused on how those objectives reflecting uncertainty will ultimately translate into

needed performance. Until now there has been no guidance on using the Balanced Scorecard for this express purpose—to enable diagnostic performance evaluation as well as interactive uncertainty management through the focusing of objectives on key environmental variables.

Finally, managers are inundated with information from multiple internal systems, which challenges their ability to focus attention and process information. A top-team's task of guiding overall performance should become more manageable by using a single system that offers the means to manage existing performance requirements and also aligns and draws attention to external forces that could disrupt the business.

4.7.3. Limitations

The findings and conclusions in this study must be evaluated in light of several limitations. Although the overall approach and testing were designed to minimize limitations, ultimately the decisions and methodological assumptions made may restrict the extent to which this research can be generalized to other settings.

The first limitation stems from the use of a single-case study. As Doz (1996) notes, "Findings from a few case studies, no matter how carefully sampled and researched, obviously deserve healthy caution" (Doz, 1996, p. 79). This statement applies to this study. The research was carried out in a single case, in a single site, in the midst of an organizational transformation. There will be limits as to its generalizability beyond the immediate setting. This challenge is mitigated by several factors. First, a comprehensive study of the literature was conducted prior to launching this study. Second, the area of study—performance measurement system use—has been noted as being both a gap and research opportunity from previously published literature (Ferriera and Otley, 2009). Finally, the model tested in this environment was developed in a similar, but different setting, and extends concepts that are well tested in more traditional industry environments.

The second limitation is methodological in nature and pertains to the use of case-study research as a means to refine the model advanced in the study. Case-study research is best used in environments where rich descriptions of largely unexplored phenomena can be generated for purposes of identifying research concepts and their nascent relationships (Yin, 2003). A much less frequently applied approach is using case studies to assess research questions versus developing them (Dul and

Hak, 2008). Normally, quantitative, survey-based efforts are used for this type of verification keeping with the positivist spirit. The number of interviewees, 17, and the small response size to the research questionnaire, 30, places a limit on the generalizability of the findings. While the top team and senior leaders are considered to have both a broad and deep understanding of the industry and organizational performance, the inherent limitations in size and scope will likely impact the use of the findings.

The final limitation relates to the challenges associated with receiving information from any set of respondents. Although every interviewee was assured of anonymity, it is still possible that they were not entirely forthcoming or accurate in their responses because of concern that the data they provided would not be used for the stated purpose of testing of the research questions. Using multiple sources of data in addition to interviewee responses, such as questionnaire data, internal financial and quality data, and company published information helped offset this risk, but it poses a limitation to this study nonetheless.

4.7.4. Opportunities for Further Research

This study explored how strategic performance measurement systems operate in turbulent environments. The findings and conclusions provide refinements to existing frameworks and enhance the way practicing managers design and use formal management control system. The findings are rooted in basic control theory, information processing theory, and contingency theory.

A possible extension of this research is exploring the impact of institutional and industry behaviors on the design and use of management control systems. The heath care industry in the United States has a tradition of lagging behind other industries with respect to the adoption of management practices, largely due to resistance among competing constituencies with the industry (e.g. physicians, administrators, research scientists). The effects of the immediate environment on strategic performance measurement design, use and evolution from the lens of institutional theory could produce important insights for both researchers and practitioners alike, within or outside of the health care industry.

Another potential focus for research is the area of more comprehensive systems to measure and manage performance overall. Frameworks and theories such as the Balanced Scorecard and Levers of Control have become widely adopted, but how

they fit into an overall system of performance is still an emerging research area (Kaplan and Norton, 2008). As industries evolve to become more network oriented like, exploring how management control systems and frameworks can be combined to enable distributed management of multiple coordinating entities would have benefit.

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6 Appendices

6.1: Studies Included in the Systematic Review

Author	Title	Source	Year	Theme	Study Type	Industry	Location	Participants	Research Question	Summary of Findings
Grant, R. M.	Strategic planning in a turbulent environment: Evidence from the oil majors	Strategic Management Journal	2003	Strategy/ Turbulent	Emp	Oil	North America	8 corporate planners and 8 oil majors	What are the principal features of the strategic planning systems of large, multi-business, multi-national corporations?	Strategic planning plays a role in large company management systems but practices have changed. Processes are more decentralized, more informal, plans are more short-term, more goals focused with less regard to actions and resource allocation. Strategic planning is also less about decision making and more about coordination and performance management.
Carpenter, M. A. and Golden, B. R.	Perceived managerial discretion: A study of cause and effect	Strategic Management Journal	1997	Strategy	Emp	Food	North America	98 practicing managers	Why do managers and organizations respond differently when confronted with similar strategic opportunities?	Individuals discriminate between high and low discretion issues. In low discretion contexts individuals with an internal locus of control tend to perceive greater discretion than do individuals with an external locus of control. In low discretion contexts, individual's perceptions of their discretion are positively and causally associated with the power others ascribe to them.
Simons, R.	The role of management control systems in creating competitive advantage: New perspectives	Accounting, Organizations and Society	1990	Strategy/PM	Emp	Unknown	North America	70 top managers in 13 firms	What is the relationship between business strategy and the firm's use of management control systems?	Based on review of the cases, the paper presents a model that can be used to link management control systems to competitive advantage. The control processes selected can be used to manage emergent strategy.
Dess, G. G. and Oringer, N. K.	Environment, structure, and consensus in strategy formulation: A conceptual integration	Academy of Management Review	1987	Strategy	Theor					The article provides four research propositions: (1) There is an inverse relationship between munificence and both consensus on objectives and methods; (2) There is a inverse relationship between environment complexity and dynamism and consensus on organizational goals and competitive methods (3) Higher performing firms that compete in low munificence industries have higher levels of integrating structure; (4) Higher performing firms that compete in high munificence industries characterized by high complexity/high dynamism have a higher level of integrating structure than less successful firms.
Dobni, C. B. and Luffmann, G.	Determining the scope and impact of market orientation profiles on strategy implementation and performance	Strategic Management Journal	2003	Strategy	Emp	Telecom	North America	210 managers	Is there a relationship between behaviors, actions and outcomes in respect to the competitive context?	There are ideal market orientations and strategy profiles that correspond to distinct competitive contexts. For firms, better orientation of behaviors and actions to contextual requirements results in better performance. For managers, changes in market orientation should correspond with changes in strategy. Resources should be allocated in accordance with desired market orientation.
Fiegener, M. K.	The control of strategy in dynamic versus stable environments	Journal of Management issues	1997	Strategy/ PM/ Turbulent	Emp	Insurance and Software	North America	100 companies total (the total from both industries)	Do firms in different environments design their strategic controls differently? Are these control processes differentially effective in different environments?	Firms facing different environmental contexts should design their strategy assessment systems differently. Firms in relatively stable environments should invest their efforts in formalizing strategy assessment procedures whereas firms in dynamic contexts would benefit from ensuring the greater involvement of line managers in strategic control activities.
Selsky, J. W., Goes, J. and Baburoglu, O. N.	Contrasting perspectives of strategy making: Applications in "hyper" environments	Organization Studies	2007	Strategy/ Turbulent	Emp	Health Care	North America	2 hospital systems	In hyper environments, is the relationship between environmental texture and strategy practices co-evolutionary versus contingent? In hyper environments is the locus of sustainable advantage the firm instead of the extended social field?	Environmental texture should be a major consideration in strategy making and empirical research should be carried out to detail the properties of hypercompetitive environments and ascertain how they evolve.
Zuniga-Vicente, J. A. and Vicente Lorente, J. D.	Strategic moves and organizational survival in turbulent environments: The case of Spanish banks	Journal of Management Studies	2006	Strategy/ Turbulent	Emp	Banking	Europe	1,257 annual observations of distributed data	What is the effect of the strategic mobility of Spanish banks on their probability of organizational extinction?	Strategic repositioning is an effective practice even when the environmental conditions become unstable and volatile--this favors adaptation versus ecology.
Fang, L-Y. and Wu, S-H.	Accelerating innovation through knowledge co-evolution: A case study in the Taiwan semiconductor industry	International Journal of Technology Management	2006	Turbulent	Emp	Semi-conductor	Far East	Single company	Why do some companies can generate new innovations more quickly and more efficiently than competitors?	Firms in a turbulent industry co-evolve by using micro-evolutional learning inside and macro-evolutional learning outside as a means of closing a technology driven knowledge gap. Micro- and macro-evolution are mutually dependent and a firm has to have the means to incorporate externally learned knowledge into routines. Knowledge co-evolution between two dyadic organizations could be the resource base of dynamic capabilities.
Zajac, E. J., Kraatz, M. S. and Bresser, R. K. F.	Modeling the dynamics of strategic fit: A normative approach to strategic change	Strategic Management Journal	2000	Strategy	Emp	Savings and Loan	North America	4,000 savings and loans	Is it possible to develop a model of "strategic fit" that is dynamic, multidimensional and normative?	A model of strategic fit is developed that incorporates a set of organizational and environmental factors that affect the desirability of an S&&L's changing its reliance on its core strategy.

Author	Title	Source	Year	Theme	Study Type	Industry	Location	Participants	Research Question	Summary of Findings
Barnett, W. P. and Burgelman, R. A.	Evolutionary perspectives on strategy	Strategic Management Journal	1996	Strategy	Lit Review					Through review of key strategy search and selection papers the authors highlight how strategy research in evolutionary in nature and that many seeming different theoretical perspectives can be drawn into one overarching view of evolution.
El Sawy, O. A. and Pauchant, T. C.	Trigger, twitches and templates in the tracking of emerging strategic issues	Strategic Management Journal	1988	Strategy	Emp	Cellular Phone	North America	17 managers	What is the role of cognitive frames of reference in the scanning process related to strategic issues and how are those frames changed by various triggers?	Template twitchings as a process can be studied through the concepts of triggers, templates and twitches. Environmental scanning twitches cognitive templates due to both environmental scanning and group discussion. Template twitching--for emergent technologies--is a function of an orderly progression of stages and twitches are more informative than templates.
Chakravarthy, B. S.	Adaptation: A promising metaphor for strategic management	Academy of Management Review	1982	Strategy	Theor					Strategy (defensive, reactive, proactive) is combined with organizational capacity (mechanistic, bureaucratic, organic) with level of stability (unstable, stable, neutral)
Henri, J-F.	Management control systems and strategy: A resource-based perspective	Accounting, Organizations and Society	2006	PM	Emp	Various	North America	383 firms	To what extent do the diagnostic and interactive uses of MCS contribute specifically to the creation and maintenance of capabilities leading to strategic choices?	Performance measurement systems used in an interactive (diagnostic) fashion contribute positively (negatively) to the deployment of capabilities of market orientation, entrepreneurship, innovativeness, and organizational learning.
Hoffer-Gittel, J.	Paradox of coordination and controls	California Management Review	2000	PM	Emp	Airline	North America	4 airlines, 9 sites, 356 employees	How should horizontally coordinated organizations ensure that the actions taken by its front line employees are consistent with organizational goals?	Different systems for achieving coordination and control can lead to significantly different outcomes. Greater cross-functional accountability, smaller supervisory spans of control, greater selection for teamwork and more active cross functional conflict resolution are associated with higher quality performance and greater efficiency.
Meade, P. T., Rabelo, L. and Jones, A.	Applications of chaos and complexity theories to the technology adoption life cycle: Case studies in the hard-drive, micro-processor, and server high-tech industries	International Journal of Technology Management	2006	Turbulent	Emp	Semiconductor Disks	North America	Product market share / unit sales for micro processors and disks	Is there a better means to forecast or predict technology adopting within high technology industries using an approach from Chaos / Complexity Theory?	The attractor framework addresses the non-linear nature the high technology market and the attractor framework is an improved means of quantitatively modeling a product's position within its lifecycle.
Burn, J.	Information systems strategies and the management of organizational change--a strategic alignment model	Journal of Information Technology	1993	PM/Turbulent	Emp	Various	Far East	56 Managers	Is there a better way to align IT strategy formulation with organizational strategies?	A relationship exists between organizational and IS strategies and suggests the pattern of strategic approach which would be needed for an organization to progress through the states of IS growth.
Grant, Robert, Azar, Jammine	Performance differences between the Wrigley/Rumelt Strategic categories	Strategic Management Journal	1988	Strategy	Emp	Manufacturing	Europe	305 firms	Do diversified firms outperform specialized firms and is there evidence that related diversification is more successful than unrelated diversification?	There is a weak relationship between diversification strategy and firm and industry characteristics. More diversified related business and unrelated business strategies were more profitable than the more specialized single-business and dominant-business strategies. Also, there is little evidence that closely related diversification was more profitable than unrelated diversification.
Schoonhoven, C. B.	High technology firms: Where strategy really pays off	Columbia Journal of World Business	1984	Strategy	Emp	Semiconductor	North America	10 largest firms	Do strategies exist in the high technology industry and are they related to performance?	High Technology firms, contrary to what they have often noted, have strategies and there are regular relationships between strategic content and firm performance.
Vancil, Richard	Strategy formulation in complex organizations	Sloan Management Review	1976	Strategy	Theor					Managers shouldn't frame strategy as one, monolithic concept, rather, it should be viewed as a collection of strategies held by individual managers, at different levels in the organization that are linked together through agreement on objectives, constraints and policies, plans and goals.

Author	Title	Source	Year	Theme	Study Type	Industry	Location	Participants	Research Question	Summary of Findings
Paroutis, S. and Pettigrew, A. M.	Strategizing in the multi-business firm: Strategy teams at multiple levels and over time	Human Relations	2007	Strategy	Emp	Multi-national firm	Europe	1 firm, 36 managers	What do strategy teams do during the strategy process?	Strategy teams engage in seven different practices when they strategize: executing, reflecting, initiating, coordinating, supporting, collaborating, shaping context. These activities shift over time within firms as the strategy making process matures.
Harris, R. D.	Organizational task environments: An evaluation of convergent and discriminant validity	Journal of Management Studies	2004	Turbulent	Emp	Various	North America	247 firms	Does the Dess and Beard (1984) construct for organizational task environments have measurement (convergent and divergent) validity?	The Dess and Beard framework has convergent validity but does not have discriminant validity. The author recommends the OTE framework provided by Dess and Beard be reexamined and possibly refitted using Aldrich (1979).
Wiggins, R. R. and Ruefli, T. W.	Sustained competitive advantage: Temporal dynamics and the incidence and persistence of superior economic performance	Organization Science	2002	Strategy	Emp	Various	North America	1,145 firms in 40 industries	Does superior economic performance persist over time in a manner consistent with sustained competitive advantage?	Classical economic theory posits that firms may achieve SCA and abnormal rents in the short or medium run but that overtime, the entire industry will revert to the mean. The study found that in every industry there were firms that achieved 10 years of persistent superior economic performance and that three firms in particular, achieved superior economic performance for almost 50 years. The profit predictability of concentration ratio is questioned as well.
Webb, D. D. and Pettigrew, A. M.	The temporal development of strategy: Patterns in the U.K. insurance industry	Organization Science	1999	Strategy	Emp	Insurance	Europe	9 firms	What are the characteristic patterns of strategy development that occur at both firm and industry level over time?	The study shows: the importance of balancing the concurrent and differing needs of strategy invention and implementation in regard to the degree of centralization and formality of decision making adopted; the role of industry traditions and norms is highlighted; the importance of executive demographic characteristics as a contributor to strategic flexibility; that competing value sets and some fluidity in the structure and balance of power at the top of organizations may contribute to the set of conditions that promote the early adoption of new strategic initiatives.
Anderson, P.	Complexity theory and organization science	Organization Science	1999	Strategy	Theor					The article presents the history and key works in the area of Complexity Theory. The theory itself as well as descriptors of complex adaptive systems are highlighted. The paper concludes by explaining how Complexity Theory can be applied in the field of strategic management as a means to help better understand adaptive behavior.
Goll, I. and Rasheed, A. M. A.	Rational decision-making and firm performance: The moderating role of environment	Strategic Management Journal	1997	Strategy	Emp	Manufacturing	North America	159 firms	What is the moderating role of environmental munificence, the moderating role of environmental dynamism and the joint effect of them both in the relationship between rationality in strategic decision processes and organizational performance?	Results of the tests support the role of environmental munificence as a moderator of the relationship between strategy-making processes and organizational performance.
Lefebvre, L. A., Mason, R. and Lefebvre, E.	The influence prism in SMEs: The power of CEOs' perceptions on technology policy and its organizational impacts	Management Science	1997	Strategy	Emp	Industrial Metal	North America	84 CEOs	What are the effects of technology policy on strategy formulation in small firms?	The focus on the strategic management of technology helps to better understand critical dimension of small firm competitiveness. Findings indicate environmental perception may be as strong--if not a stronger--influence on the formulation and enactment of technology policy in SMEs.
Chakravarthy, B. S.	A new strategy framework for coping with turbulence	Sloan Management Review	1997	Strategy/ Turbulent	Theor					Discusses the history and key elements of environmental turbulence. The paper discusses turbulence within the Info-com industry and presents a framework for conceptualizing the merging of its constituent industries and for coping with resulting turbulence.
Ward, P. T., Duray, R., Leong, G. K. and Sum, C. C.	Business environment, operations strategy, and performance: An empirical study of Singapore manufacturers	Journal of Operations Management	1995	Strategy/ Turbulent	Emp	Manufacturing	Far East	319 firms	What is the relationship between the environment and operations strategy?	Environmental concerns appear to have a substantial impact on operations strategy and that good performers adopt different operations strategies in response to environmental stimuli that do poor performers.
Prahalad, C. K.and Hamel, G.	Strategy as a field of study: Why search for a new paradigm?	Strategic Management Journal	1994	Strategy	Theor					Strategy as a field of research is as vibrant as ever before. Scholars need to start shifting away from the topic of 'Execution' and focus more on strategic thinking that addresses the drivers of change highlighted in the article.

Author	Title	Source	Year	Theme	Study Type	Industry	Location	Participants	Research Question	Summary of Findings
Levy, D.	Chaos theory and strategy: Theory, application and managerial implications	Strategic Management Journal	1994	Strategy	Emp	High Technology	North America	1 case-study company	What is the impact of applying Chaos Theory to Strategic Management?	The business simulation run for the computer company's supply chain shows that chaos theory has practical applications in the area of business strategy.
Kennerley, M. and Neely, A. D.	A framework of the factors affecting the evolution of performance measurement systems	International Journal of Operations and Production Management	2002	PM	Emp	Various	Europe	25 managers at 7 firms	What factors encourage (inhibit) the introduction of new measures, modification of existing measures and deletion of obsolete measures?	Four elements of a PMS that should be updated: process, people, systems and culture. There is also an evolutionary cycle than encapsulates the update: use, reflect, modify and deploy.
Kennerley, M. and Neely, A. D.	Measuring performance in a changing business environment.	International Journal of Operations and Production Management	2003	PM/Turbulent	Emp	Various	Europe	7 firms	What factors affect (facilitate and inhibit) the way in which measurement systems change over time? How can organizations manage their measurement systems so that they continually remain relevant?	A model of PMS management is presented--use, reflect, modify, deploy--that can be used to adapt a PMS over time in a changing business environment to ensure relevancy in the areas of process, people, systems and culture.
McAdam, R. and Baillie, B.	Business performance measures and alignment impact on strategy	International Journal of Operations and Production Management	2002	Strategy/PM	Emp	Aerospace	Europe	30 managers	What is the alignment between performance measures and business strategies? What is the role of business improvement frameworks as a key catalyst in this alignment process?	An appropriate mix of measures will yield the best alignment with the business strategy. It was also confirmed that measures linked to the programmes that were explicitly mentioned in the strategic plans and were considered as strategic performance measures, by the parent company, were perceived as more successful.
Sidhu, J. S., Nijssen, E. J. and Commanduer, H. R.	Business domain definition practice: Does it affect organizational performance?	Long Range Planning	2000	Strategy	Emp	Various	Europe	63 managers	Does the definition of business domain (demarcation of competitive boundaries) affect organizational performance?	In a turbulent industry, define organizational business domain more narrowly using technological competencies as a key reference point. In a stable industry, define an organization's business boundaries more broadly using substitute product industries as a reference point. Explicitly articulate the business domain of the organization.
Davila, T.	The promise of management control systems for innovation and strategic change	In the book Controlling Strategy	2005	Strategy/PM/ Turbulent	Theor					A framework for analyzing the different roles that formal MCS play in managing innovation is proposed and business strategy-specifically given the components of strategy (current and future) and the organizational context (structural or strategic) and MCS role is proposed.
Brews, P. J. and Purohit, D.	Strategic planning in unstable environments	Long Range Planning	2007	Strategy/ Turbulent	Emp	Various	North America	886 firms	How should strategic planning be adjusted in the face of more challenging contexts?	The study confirms that planning is correlated with performance--in unstable environments as well as stable. In dynamic environments, transactive and generative planning are most important.
Burgelman, R. A.	A model of the interaction of strategic behavior, corporate context and the concept of strategy	Academy of Management Review	1983	Strategy	Theor					The article integrates two themes of research on induced versus autonomous strategic activities, provides research propositions and concludes noting that both strategy follows structure and structure follows strategy.
Hofer, C. W. and Schendel, D. E.	Strategy formulation: Analytical concepts	Book	1978	Strategy						Reviewed
Andrews, K. R.	The concept of corporate strategy	Book	1971	Strategy						Reviewed

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Dess, G. G. and Beard, D. W.	Dimensions of organizational task environments	Administrative Science Quarterly	1984	Turbulent	Emp	Manufacturing	North America	52 manufac-turing industries	Will organizational task environments vary in terms of their munificence, and environmental capacity variables? Will organizational task environments will vary in terms of their complexity, and homogeneity-heterogeneity and concentration-dispersion variables? Will organizational task environments will vary in terms of dynamism, and stability-instability and turbulence variables?	The study demonstrated by analyzing underlying variables that organizational task environments can be dimensionalized in terms of munificence, dynamism and complexity.
Lawrence, P. R. and Lorsch, J. W.	Differentiation and integration in complex organizations	Administrative Science Quarterly	1967	Strategy/Turbulent	Emp	Chemical	North America	6 companies	What patterns of differentiation and integration of the parts of a large organizational system is associated with the organization's coping effectively with a given external environment?	In order to be effective in dynamic environments organizations must be able to manage a range of differentiating and integrating variables which are at times at odds. Six variables are examines in six firms and the ones able to manage a high degree of differentiation and a high degree of integration experience the best system performance.
Gupta, A. K. and Govindarajan, V.	Business unit strategy, managerial characteristics, and business unit effectiveness at strategy implementation	Academy of Management Journal	1984	Strategy/PM	Emp	Diversified	North America	General managers from 58 business units	What is the effect of managerial orientation to SBU strategy on SBU effectiveness in strategy implementation?	Greater marketing/sales experience, greater willingness to take risk, and greater tolerance for ambiguity contribute to effectiveness in the case of build SBUs but hamper it in the case of harvest SBUs.
Ansoff, H.I.	Corporate strategy	Book	1965	Strategy						Reviewed for Scoping Study
D'Aveni, R. A.	Hypercompetition	Book	1994	Strategy						Reviewed for Scoping Study
Aldrich, H. E.	Organizations and environments	Book	1979	Turbulent						Reviewed for Scoping Study
Quinn, J. B.	Strategic change: Logical incrementalism	SMR	1978	Strategy	Theor					Claims that strategy making in organizations is not the byproduct of rational design or muddling through but rather the careful progression of a process called Logical Incrementalism whereby cognitive limitations are challenged, frameworks are built and personal/organizational awareness is gained necessary to implement strategy.
Miller, D. and Friesen, P. H.	Strategy-making and environment: The third link	Strategic Management Journal	1983	Strategy	Emp	Diversified	North America	50 CEOs of Canadian firms	What is the link between strategy-making behavior and the environment?	Increased environmental dynamism seems to require the need for both more analysis and innovation; growing environmental hostility seems to require additional analysis; firms facing more heterogeneity seem to benefit from innovation.
Bourgeios, L. J., III	Strategic goals, perceived uncertainty and economic performance in volatile environments	Strategic Management Journal	1985	Strategy/ Turbulent	Emp	Non-Diversified firms (service, high tech and manufacturing)	North America	99 top managers	What is the relationship between strategic goals among top management teams, the common view of environmental uncertainty and performance of the firm?	Congruence between PEU and volatility is positively related to economic performance; Both diversity in environmental perceptions and diversity in goals within firms relates positively to performance; Consensus as to PEU and goal consensus together is associated with poor performance; the number of strategic goals has no signifiant relationship with performance.
Schreyogg, G. and Steinmann, H.	Strategic control: a new perspective	Academy of Management Review	1987	PM	Theor					The paper presents a three step model to strategic control that consists strategic surveillance, premise control and implementation control.

Author	Title	Source	Year	Theme	Study Type	Industry	Location	Participants	Research Question	Summary of Findings
Brown, S. L. and Eisenhardt, K. M.	The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations	Administrative Science Quarterly	1997	Turbulent	Emp	Computer Industry	North America	81 high- and low-level respondent interviews	How do organizations continuously change in the context of multiple product innovation?	Organizational adaptation is more complex than the explanation provided by the punctuated equilibrium model. Organizations behave more like complex adaptive systems where change is continuous in an effort to link past, present and future performance.
Eisenhardt, K. M. and Sull, D. N.	Strategy as simple rules	Harvard Business Review	2001	Strategy	Theor					In business where the situation is complex and the change constant organization need to be able to execute strategy using simple rules. These rules are summarized in five types: How To rules; Boundary rules; Priority Rules; Timing Rules; Exit Rules
Pascale, R. T.	Surfing the edge of chaos	Sloan Management Review	1999	Strategy/ Turbulent	Theor					A description of Complex Adaptive Systems is provided. The four tests are highlighted. They are then applied to strategic management with the conclusion organizations should seek to become 'designed for emergence' in order to better fit themselves into and take advantage of shifting environments.
Beinhocker, E. D.	Robust adaptive strategies	Sloan Management Review	1999	Strategy/ Turbulent	Theor					The article provides concepts and guidance regarding the development of strategy in and evolutionary mode--more analogous to naturally, evolutionary organisms than rationally designed systems.
Goold, M. and Quinn, J. J.	The paradox of strategic controls	Strategic Management Journal	1990	Strategy/ PM/ Turbulent	Lit Rev					The paper provides a literature review of strategic control through 1990. It presents the purposes and components of a strategic control system, highlight problems with strategic control and concludes with a contingency theory of strategic controls.
Goold, M.	Strategic control in the decentralized firm	Sloan Management Review	1991	Strategy/ PM/ Turbulent	Theor					The paper provides a discussion of the components of a formal strategic control process and offers guidance on how to create one in practice.
Hrebiniak, L. G. and Joyce, W.	Organizational adaptation: Strategic choice and environmental determinism	Administrative Science Quarterly	1985	Strategy/ Turbulent	Theor					The paper develops an interactive view of the adaptation process in organizations in an effort to integrate literatures in organization theory, management, and economics.
Eisenhardt, K. M.	Making fast strategic decisions in high-velocity environments	Academy of Management Review	1989	Strategy/Turbulent	Emp	Computer Industry	North America	8 top management teams	What affects the managers' speed of strategic decision-making?	Strategic interactions among top management teams are more important than decision characteristics, problem solving ability may be more important than a rational approach to decision making; emotion is a key component of decision-making.
Child, J.	Organizational structure, environment and performance: The role of strategic choice	Sociology	1972	Turbulent	Theor					Presents the commonly used variables of environment, technology and size (e.g. structure) in assessing firm performance. Emphasizes the role of strategic 'choice' by managers as another variable that may more aptly explain both structure and performance.
Thompson, J. D.	Organizations in action	Book	1967	Turbulent						Describes the nature and form of organizations, how they are structured and how they emerge. Also provides insights via proposition regarding further research areas.

6.2: Studies Excluded From the Systematic Review

Author	Title	Year	Reason Excluded
Newkirk, H. E. and Lederer, A.	The effectiveness of strategic information systems planning under environmental uncertainty	2006	Relevancy—information systems.
Acur, N. and Englyst, L.	Assessment of strategy formulation: How to ensure quality in process and outcome	2006	Quality concerns-case analysis.
Varakarajan, R.	A two factor classification of competitive strategy variables	1985	Study pertained to intersection of marketing and strategy.
Dyer, L. and Hain T.	Bringing human resources into the strategy formulation process	1983	Explored role of Human Resource managers in strategy.
Melcher, A. and Melcher, B.	Toward a systems theory of policy analysis: Static versus dynamic analysis	1980	Discussed dynamic analysis approach to strategy formulation.
Ronchi, L.	The decision-making process for strategic adaptation	1980	Discussed strategic adaptation.
Cohen, K. and Cyert, R.	Strategy: Formulation, implementation and monitoring	1973	Presents a basic strategic planning process only.
Velayath, Rajaram	Strategic planning: Balancing short-run performance and longer term prospects	1992	Discussed strategic planning viewpoints from an anticipator and hindsight perspective.
Elaine Mosakowski, P. Christopher Early	A selective review of time assumptions in strategy research	2000	Deals with views of time and matching conceptions of time to industry conditions.
Henry Mintzberg, Joseph Lampel	Reflections on the strategy process	1999	Presents 10 schools of strategy. Reviewed in scoping study.
Dixon, Rob	Accounting for strategic management: A practical application	1998	Relevancy--management accounting.
McGee John, Thomas, Howard, Pruett, Mark	Strategic groups and the analysis of market structure and industry dynamics	1995	Discusses strategic groups.
Greenley, Gordon	Market orientation and company performance: Empirical evidence from UK companies	1995	Quality concerns-survey methods.
Dixon, R. and Smith, D.R.	Strategic management accounting	1993	Relevancy--management accounting.
Ansoff, H. I. and Sullivan, P.	Optimizing profitability in turbulent environments: A formula for strategic success	1993	Quality concerns-survey methods.
Boynton, A. C.	Achieving dynamic stability through information technology	1993	Relevancy-information technology.
Bartlett, C. and Goshal, S.	Global strategic management: Impact on the new frontiers of strategy research	1991	Presents an agenda for strategic management research.
Nakamura, G.	Strategic management in major Japanese high tech companies	1988	Outdated, industry specific information.
Pearce, J.	An executive-level perspective on the	1991	Quality—narrative lacks rigor.

	strategic management process		
Gluck, F., Kaufman, S. and Walleck, S.	Strategic management for competitive advantage	1980	Presents well-understood strategic planning phases.
Santos, S. Belton, V. and Howick, S.	Adding value to performance measurement by using system dynamics and multi-criteria analysis	2002	Lacks rigor and relevance to study.
Blenkinsop, S. A. and Burns, N.	Performance management revisited	1992	Highlights change management approach to PMS implementation.
Harrington, R. J., Lemark, D., Reed, R. and Kendall, K.	A question of fit: The links among environment, strategy formulation and performance	2004	Quality—finds only weakly support research question.
Macbeth, D.	Emergent strategy in managing cooperative supply chain change	2002	Quality—consulting methodology application to case example.
Keck, S.	Top management team structure: Differential effects by environmental context	1997	Relevancy—focus on top management team structure and decision making.
Wall, S. and Wall, S. R.	The evolution (not the death) of strategy	1995	Relevancy—discussed consultants' perspectives on strategy formulation.
Morgan, G.	Rethinking corporate strategy: A cybernetic perspective	1983	Quality—descriptive without significant theoretical support.
Grinyer, P.	The anatomy of business strategic planning reconsidered	1971	Presents a "new" model for strategic planning—already well considered in existing literature.
Melnyk, S., Stewart, D. and Swink, M.	Metrics and performance measurement in operations management: Dealing with the metrics maze	2004	Relevancy—presents research considerations in the field of operations management.
Ketchen, D. Snow, C. and Hoover, V.	Research on competitive dynamics: Recent accomplishments and future challenges	2004	Relevancy—reviews competitive dynamics research and discusses the focus of future empirical work.
Shay, J. and Rothaermal, F.	Dynamic competitive strategy: Toward a multi-perspective conceptual framework	1999	Relevancy—integrates for strategy analysis models to demonstrate simultaneous use.
Brouthers, K. and Foozen, F.	Is it time to start thinking about strategic accounting?	1999	Relevancy—management accounting.
Carini, G., Living stone, L. and Parrack, L.	East vs. West: Strategic management perspectives from formal logic and the logic of contradiction	1998	Relevancy—contrasts view of RBV and I/O
Sanchez, R.	Strategic management at the point of inflection: Systems, complexity and competence theory	1997	Quality—unsophisticated summary of complexity theory. Complexity theory is captured in other papers in the review.
Henderson, R. and Mitchell, W.	The interactions of organizational and competitive influences on strategy and performance	1997	Article summary by the editors of a special edition
Carayannis, E. G.	The strategic management of technological learning: Transnational decision making frameworks and their empirical effectiveness	1995	Unable to locate paper from Journal of International Business.

Schendel, D.	Introduction to competitive organization behavior: Toward an organizationally based theory of competitive advantage	1994	Article summary by the editors of a special edition.
Garud, R. and Kumaraswamy, A.	Changing competitive dynamics in network industries: an exploration of Sun Microsystems' open systems strategy	1993	Quality—method.
Levinthan, D. and March, J.	The myopia of learning	1993	Relevancy—discusses the limitation of organizational learning.
Fiegenbaum, A., Sudharshan, D. and Thomas, H.	Strategic time periods and strategic groups research: Concepts and empirical example	1990	Relevancy—focuses on strategic groups.
El Sawy, O. A. and Nanus, B. Burt	Toward the design of robust information systems	1989	Relevancy—information technology.
Cunningham, M. and Culligan, K.	Competition and competitive groupings: An exploratory study in information technology markets	1988	Relevancy—focuses on strategic groups.
Child, J. and Smith, C.	The context and process of organizational transformation—Cadbury Limited in its sector	1987	Describes competitive transformation of a single firm.
Mintzberg, H.	The strategy concept I: Five Ps for strategy	1983	Excellent descriptive work but not related directly related to topic.
Gluck, F.	Strategic management for the eighties	1983	Practitioner's early description of strategic management.
Ringbakk, K-A.	Strategic planning in a turbulent international environment	1976	Dated conceptual paper that deal with issues of international management.
Bititci, U., Mendibil, K., Nudurapati, S., Garengo, P.and Turner, T.	Dynamics of performance measurement and organizational culture	2006	Quality—small sample size combined with lack of rigor in method.
Bititci, U., Turner, T. and Begeman, C.	Dynamics of performance measurement systems	2000	Descriptive value only.
Rotch, W.	Management control systems: One view of components and their interdependence	1993	Describes components of management control and provides descriptions from 4 Darden cases of the components in application.

6.3: Candidate Firms for Study

Search 1: 29 Companies
Search Parameters
Location: New England
Industry: Security Software

Company Name	HQ Address1	HQ Address2	HQ City	HQ State/Province	Web Address	Company Type	Location Type	Exchange	Symbol	Revenue ($ million)	Total Employees
Arbor Networks, Inc.	430 Bedford St.	Ste. 160	Lexington	MA	http://www.arbornetworks.com	Private	Headquarters			--	--
Aware, Inc.	40 Middlesex Tpke.		Bedford	MA	http://www.aware.com	Public	Headquarters	NASDAQ (GM)	AWRE	24.1	117
BAE Systems Electronics & Integrated Solutions	65 Spit Brook Rd.		Nashua	NH	http://www.baesystems.com/Businesses/EIS	Private	Headquarters			725.7	8900
ClearPoint Metrics, Inc.	1 Kendall Sq.	Bldg. 300, 2nd Fl.	Cambridge	MA	http://www.clearpointmetrics.com	Private	Single Location			--	--
CoreStreet, Ltd.	1 Alewife Center	Ste. 200	Cambridge	MA	http://www.corestreet.com	Private	Single Location			4.9	50
Courion Corporation	1881 Worcester Rd.		Framingham	MA	http://www.courion.com	Private	Headquarters			16.1	88
Cyber-Ark Software, Inc.	270 Bridge St.	Ste. 203	Dedham	MA	http://www.cyber-ark.com	Private	Single Location			5.8	60
Ellacoya Networks, Inc.	7 Henry Clay Dr.		Merrimack	NH	http://www.ellacoya.com	Private	Headquarters			18.5	200
Entegrity Solutions Corporation	410 Amherst St.	Ste. 150	Nashua	NH	http://www.entegrity.com	Private	Headquarters			2.8	25
Enterasys Networks, Inc.	50 Minuteman Rd.		Andover	MA	http://www.enterasys.com	Private	Headquarters			80.8	750
GlobalCerts, LC	35 Constitution Dr.		Bedford	NH	http://www.globalcerts.net	Private	Single Location			1.3	15
Liquid Machines, Inc.	486 Totten Pond Rd.		Waltham	MA	http://www.liquidmachines.com	Private	Headquarters			6.7	55
Mazu Networks, Inc.	125 Cambridge Park Dr.	4th Fl.	Cambridge	MA	http://www.mazunetworks.com	Private	Single Location			6.7	45
Newbury Networks, Inc.	745 Boylston St.		Boston	MA	http://www.newburynetworks.com	Private	Single Location			1.8	20
NitroSecurity, Inc.	230 Commerce Way, Ste. 325		Portsmouth	NH	http://www.nitrosecurity.com	Private	Headquarters	NASDAQ (CM)	NITR Proposed	2.4	51
Novell, Inc.	404 Wyman St.	Ste. 500	Waltham	MA	http://www.novell.com	Public	Headquarters	NASDAQ (GS)	NOVL	932.5	4549
NTRU Cryptosystems, Inc.	35 Nagog Park		Acton	MA	http://www.ntru.com	Private	Single Location			3.1	31
Ounce Labs, Inc.	100 5th Ave.		Waltham	MA	http://www.ouncelabs.com	Private	Single Location			1.0	45
Primeon, Inc.	18 Commerce Way	Ste. 3000	Woburn	MA	http://www.primeon.com	Private	Single Location			3.5	70
Protegrity Corporation	15 Bank St.		Stamford	CT	http://www.protegrity.com	Private	Headquarters			2.8	85
Q1 Labs, Inc.	1000 Winter St.	Ste. 2950	Waltham	MA	http://www.q1labs.com	Private	Single Location			3.8	40
Q1 Labs, Inc.	1000 Winter St.	Ste. 2950	Waltham	MA	http://www.q1labs.com	Private	Single Location			4.9	45
Rocket Software, Inc.	275 Grove St.		Newton	MA	http://www.rocketsoftware.com	Private	Headquarters			17.1	217
RSA Security Inc.	174 Middlesex Tpke.		Bedford	MA	http://www.rsasecurity.com	Public	Headquarters			141.9	1319
SSH Communications Security, Inc.	20 William St.	Ste. G35	Wellesley	MA	http://www.sshcom.com	Private	Headquarters			7.2	18
TLIC Worldwide, Inc.	50 S. County Commons Way		Wakefield	RI	http://www.tlic.com	Private	Single Location			3.0	15
Verano Inc.	575 West St.	Ste. 120	Mansfield	MA	http://www.verano.com	Private	Headquarters			3.4	30
Verdasys, Inc.	950 Winter St.	Ste. 2600	Waltham	MA	http://www.verdasys.com	Private	Single Location			3.7	37
Wave Systems Corp.	480 Pleasant St.	Ste. 3	Lee	MA	http://www.wave.com	Public	Headquarters	NASDAQ (GM)	WAVX	3.1	96

6.4: Project 2 Interview Protocol

This section presents the interview protocol used for this research and includes a description of the interview phases, the interview process, the areas of inquiry, and the specific questions. Developed prior to contact with study participants, this protocol was followed consistently for each of the seven study firms.

6.4.1. Interview Phases

There will be four phases in the conduct of the case studies:

a. Initial desk analysis.
b. Interview preparation;
c. Interview conduct;
d. Case study report write-up.

6.4.2. Initial Desk Analysis

For each of the case companies selected, desk analysis will be performed consisting of the following activities: reviewing annual reports and Securities and Exchange Commission filings; reading industry or company analysts' reports; examining mainstream published information, such as newspaper or magazine articles; and skimming Internet information, such as blogs or individual published sources. The results of the desk analysis will be a synthesized summary of case background that can be used to inform interview preparation.

6.4.3. Interview Preparation

Interviews are to be conducted with each member of the top management team in the following order: chief financial officer (or finance head), chief executive (or general manager), and then top management team members who participated in the strategic decisions of concern. The background of executives will be reviewed and their specific areas of responsibility will be understood. Their role on the top management team will also be clarified in advance of the interview.

6.4.4. Interview Conduct

The first interview will be held with the chief financial officer or senior finance official within the organization. This interview is intended to develop an understanding of how the organization measures strategic performance at the time of the interview. Questions will be asked relating to the strategic performance

measurement system such as how intended strategy is developed, agreed on, articulated, resourced, and managed throughout the business and strategic planning cycles. Also, they will be asked if they have any dashboards, scorecards, or other frameworks they use to help manage performance, specifically as it pertains to the strategy. This will only be done in general terms using the questions highlighted in Section 6.4.8. During the initial interview, the chief financial officer will identify three strategic decisions the organization has made within the past five years—ideally, they will be within the past two years so the top management team has a better recollection of each decision. The chief financial officer will then be asked to describe the events leading up to the decision as well as the decision-making process itself. The questions in 6.4.8 will be used as a guide. Before the interview ends, the chief financial officer will be asked to select from the list in the *Research Framework* section, which performance management frameworks are employed within the organization. These frameworks will be captured for analysis and, depending on the extent to which these systems are used, they will be tested in subsequent interviews.

The second interview will be held with the chief executive of the organization. The chief executive will be asked to first confirm that the decisions selected by the chief financial officer were in fact strategic decisions. Then, the questions highlighted in Section 6.4.8 will be asked of the chief executive officer. On completion the decision analysis, the chief executive will be asked to identify—and provide access to—the other senior executives who participated in the decision-making process.

Final interviews will be held with the senior executives identified by the chief executive officer in the strategic decisions above. They will be asked to describe the strategic decision, the decision-making process, and the sources of data and information that informed the decision prior to and during the decision-making process. Again, the questions in Section 6.4.8 will be used as a guide.

When and where practicable, on-site interviews will be conducted. Alternatively, phone interviews will be held with individuals identified above. All interviews will be recorded and then transcribed in order to facilitate analysis as well as confirmation of accuracy by the interviewees.

6.4.5. Case Study Report Write-up

As soon as possible after completion of the interview, the interview will be transcribed. Further, the initial case study report will be drafted. When completed, the interview will be compared to the case study write-up to ensure consistency.

6.4.6. Areas of Inquiry

The following areas of inquiry will be addressed primarily through the case study deskwork.

6.4.6.1. Description of the Security Software Industry

A comprehensive composite of the security software industry will be developed in order to understand how the industry is organized, how firms are positioned, and industry economics as well as how firms compete in the industry. Further, it is important to understand what major changes have occurred or are occurring within the fields that affect the case organizations. Areas to be addressed include the following:

- Industry size and growth rate
- Industry groups
- Types of products/technologies
- Major issues facing the firms
- Industry economics

Much of this information will be gained from published secondary information providers, such as Hoovers, Gartner Group, or IDS.

6.4.6.2. Description of Each Selected Firm and its Products/Services

A short description of the firm, its history, its products and services, and its performance will be developed from secondary data initially. This information will be confirmed and supplemented during the interview process. Areas to be addressed include the following:

- Description of firm
- Firm's products and services
- How the firm competes/what the firm's strategy is
- Firm's financial performance

6.4.6.3. Position of the Firm in Its Industry

Along with assessing their own firm position, managers will be asked to identify other firms and the position they occupy within the industry. Areas of inquiry will entail the following:

- Identification of the closest competitors
- Position of the firm within the industry
- How the positioning of the firm has changed over time
- Positioning of other competitors in the industry and how they have changed over time

The information in section 6.4.6 will be explored through the interview process.

6.4.7. The Firm's Strategic Performance Measurement System

From interviews with the custodians of the strategic performance measurement system as well as with key managers, the firm's strategic measurement system will be understood and evaluated. The purpose is to gain knowledge of how the firm measures strategic performance currently and which elements of the strategic performance measurement system are most important.

6.4.8. Strategic Decisions

The unit of analysis for this study is the strategic decision, including decisions the organization has made over the analysis horizon (2002-2006). Strategic decisions by their very nature are high-stakes decisions on which the future success of the firm is placed. The chief financial officer, chief executive, and selected top management team members within the organization will be asked to describe the decisions themselves, the decision-making process, and most importantly, the data and information used to assist in informing the decision. In order to understand the nature of the decision, a series of questions will be asked. Each level of question is profiled in Section 6.4.8.

In the area of strategic decisions, it would be difficult to profile all the topics and questions that could constitute the inquiry. A retrospective approach will be followed however. This means that the decision identified will be traced backward through the process that was used to make the decision to the point in time when

the issue prompting the decision was initially identified. At all points throughout the journey from issue identification to decision, critical data and information flows will be probed to gain a better understanding of what information was gathered, from what source, and why. Scholars accept that strategic decisions—due to their complexity and relative infrequency as compared to routine decisions—require greater amounts of information and higher levels of behavioral integration to be effectively made (Galbraith, 1973). The expectation exists then that there will be a certain novelty to the information that coincides with the novelty of the decision.

6.4.9. Interview Format and Questions

The following format and questions will be used during each phase of the interview.

6.4.8.1. Introduction

In the introduction, the purpose of the study will be explained, which is to gain a better understanding of how firms in turbulent environments measure strategic performance. In the introduction, general definitions of strategic performance measurement and management will be provided. An effort will be made to draw a distinction between strategic performance measurement and other forms of organizational performance measurement. At this point, the confidentiality of responses will be confirmed as well as the non-attribution nature of specific comments used in any research write-ups. The interviewee will be asked if the interview may be recorded and will be made aware that the transcript for the interview will be provided to them for review should they be interested.

6.4.8.2. Strategic Performance Measurement System Exploration

The chief financial officer will be asked selected questions from the listing below in order to better determine the function of the strategic performance measurement system:

- How does the firm set strategy? Does the firm engage in deliberate strategic planning? How does the process work? How often is it conducted? Who participates? What are the key inputs and outputs? Can I see a sample plan?
- How are the key elements of the strategy resourced? Is there a separate strategic budget? How does the strategy get incorporated into the forecast and the operating plan? Are major strategic initiatives developed? How are they funded?

- Do you have a set of what might be considered strategic performance measures? Do they fall into any format like a dashboard or a scorecard? How many measures are there? Do they change frequently? How often is strategic performance management information collected?
- What types of analysis is driven by the strategic performance measurement information? What types of analytics are conducted (e.g., quantitative, qualitative)? Who conducts it? Who uses the analysis and how? To what extent does performance analysis impact decision-making?
- How is strategic performance measure information and performance analysis reviewed? How often is it reviewed? Is it done formally or informally? Is it done on a prescheduled basis, ad hoc basis, or both? Who participates? What types of decisions are made? To what extent are decisions made with information discussed previously?
- What kinds of actions come from the strategic performance measurement information and performance analysis? Can you provide examples? Who tracks and follows up on these decisions to ensure they are carried out? What is the level of formality associated with this?

6.4.8.3. Strategic Decision Exploration

On completion of the strategic performance measurement system inquiry, the chief financial officer will be asked to identify three strategic decisions for further discussion. The following questions will be asked to first identify and then probe the decisions themselves:

To identify the decision:

- Over the course of the past 5 years (ideally the past 2 years), identify a major strategic decision your organization has made (this will be done three times). Please explain the decision—how it came about and why it was necessary.
- Why in your opinion it is strategic in nature?

To probe the decision (for use with all executives):

- Decision Scoping:
    - When was the decision actually made? When were the issues first identified? Roughly over what time period did this transpire? (Time frame)

- How important was this decision to the future of the organization? (Importance)
- Why was this decision necessary in the first place? (Rationale)
- How many people were involved in making this decision? (Involvement)
- What were the effects of this decision? (Impact)

- Decision Analysis:
  - Describe how you went about analyzing the decision. What factors did you consider?
  - Describe how the top team interacts at this point. Was information shared openly? Was there constructive/rigorous debate? How was the ultimate decision made?

- Information Use:
  - How did you become aware of the issue initially? What was the source of the information regarding the issue?
  - What information did you gather to help better understand the nature of the issue and what decision might be required?
  - What information was collected from existing measurement systems within the organization?
  - What information proved the most critical?
  - What information was new, unavailable and needed to be searched for?

- Decision Quality:
  - How satisfied were you personally with the following:
    - The decision itself
    - The process the executive team used to make the decision
    - The information available to inform the decision when the issue was first identified
    - The information available to inform the decision at the point when the decision was actually made
  - Rate your satisfaction with the decision overall on a scale from 1 to 7, in which 1 equals excellent and 7 equals poor.

6.5: Green Zone Networks Case

Below is an example of one of the seven cases prepared for data analysis purposes.

Green Zone Networks Timing

Originally created: 2/19/10, updated 11/25/10

This case provides a consolidation and analytic review of two interviews conducted with the chief financial officer of Green Zone Networks. Each interview was analyzed and organized into the framework of the underlying research questions presented in Section 3.4.2.

Company Background

Founded in 2000, Green Zone Networks delivers network security and operational performance analysis for global business networks. Through their core product line—Blaster—they are able to provide network behavior analysis and anomaly detection solutions that help organizations protect against a wide range of threats, including worms, data theft, discruption of service (DoS) attacks, botnets, and more. Green Zone's Blaster products enable businesses to harden their networks, maintain business continuity, and prevent the loss of customer confidence. The company serves organizations in the enterprise market as well as technology service providers. The company earned $45,000,000 in revenue in 2007. Green Zone is privately held and received funding from Charger Ventures, Ronald Romen Venture Partners, and Waxco Systems[9].

The CFO, Tom Bostin, was interviewed on two separate occasions. During the first interview, he provided information pertaining to the company's strategic performance measurement and management system. In the second interview, he highlighted three major decisions the firm made and discussed the process used to make each decisions as well as the management team's satisfaction with those decisions.

At the time of the interviews, Tom was no longer the CFO at Green Zone Networks. In 2008, the company purchased Cortona and the CFO from Cortona—Don Bagley—

[9] The firm's name, product names, investor firm names and individual have all been changed to protect anonymity.

moved into Tom's position. Tom ultimately left the company for another opportunity.

Question 1: What strategic performance measures are used by firms in turbulent settings?

Measures Overall

During the course of the discussion, 31 separate measures were identified, as shown in Table 1. These represent a holistic set of measures used to govern the business overall. The measures vary in terms of frequency of use. Twelve measures—pertaining to sales activity and sales, headcount, product trials, and capital expenditures were looked at on a weekly basis. Thirteen measures were looked at on a quarterly basis, and these consisted of expense, profit, and asset-oriented measures, such as inventory and cash flow. The remaining six measures were not given a specific periodicity; these pertained largely to customer matters and product/market issues.

Table 1: Green Zone Networks Measures

Measure Name	*Kind*	*Unit*	*Temporality*	*Purpose*	*Users*	*Frequency*
Revenue						
Breakeven Point	Financial	Units	Historical	Understand volume	Mgmt, Finance	
Bookings	Financial	Dollars	Historical	Sales planning	BOD, Mgmt, Finance, Sales	Q
Orders/Order Flow	Financial	Dollars	Historical	Sales planning	BOD, Mgmt, Finance, Sales	Q
Sales in Aggregate	Financial	Dollars	Historical	Sales planning and performance	BOD, Mgmt, Finance, Sales	W
Sales by Product/Service	Financial	Dollars	Historical	Sales planning	BOD, Mgmt, Finance, Sales	W
Sales by Geography	Financial	Dollars	Historical	Sales planning	BOD, Mgmt, Finance, Sales	W
Sales by Team	Financial	Dollars	Historical	Sales planning	BOD, Mgmt, Finance, Sales	W
Sales Quotas	Financial	Dollars	Historical	Sales planning	Mgmt, Finance, Sales	Q
Leads	Non-Financial	Number	Predictive	Inform sales process	Mgmt, Marketing, Finance	W
Sales Prospects	Financial	Dollars	Predictive	Sales planning	Management, Finance, Sales	W
Expenses						
Expenses Overall	Financial	Dollars	Historical	Overall cost structure	BOD, Mgmt, Finance	Q
Salary/Headcount	Financial	Dollars	Historical	Human Capital Planning	BOD, Mgmt, Finance	W
Marketing Expense	Financial	Dollars	Historical	Understand Marketing Spend	BOD, Mgmt, Finance, Marketing	Q
Profit						
Gross Margins	Financial	Dollars	Historical	Understand profitability	Mgmt, Finance	Q
Profit (in total or by segment)	Financial	Dollars	Historical	Understand profitability	Mgmt, Finance	Q
Asset						
Cash	Financial	Dollars	Historical	Cash available	Mgmt, Finance	Q
Cash Flow	Financial	Dollars	Historical	Cash expended	Mgmt, Finance	Q
Inventory	Financial	Dollars	Historical	Investment in Trial Units	Finance	Q
Account Receivable	Financial	Dollars	Historical/Predictive	Collections	Finance	Q
Investment						
Capital Expenditures	Financial	Dollars	Historical	Equipment investment	Mgmt, Finance	W
Customer						
Customer Satisfaction	Non-Financial	Unk	Historical	Product Satisfaction	Sales, Product Management	
Product Trial Conversions	Non-Financial	Percent	Predictive	Inform sales process	BOD, Mgmt, Finance	W
Customer Issues/Escalations/Interruptions	Non-Financial	Number	Historical	Problems with accounts	Management, Sales, Product Dev.	
Product Trials	Non-Financial	Number	Predictive	Inform sales process	BOD, Mgmt, Finance	W
Website Hits	Non-Financial	Number	Historical	Understand marketing success	Management, Marketing	W
Product						
Product Issues/Bugs	Non-Financial	Number	Historical	Focus Product Developmet	Management, Product Dev.	
Product Change Requests	Non-Financial	n/a	Historical	Focus Product Developmet	Management, Sales, Product Dev.	
Human Resource						
Headcount	Non-Financial	People	Historical	Human Capital Planning	Mgmt, Finance	W
Management by Objectives	Non-Financial	Number	Historical	Human Capital Development	All Employees	Q
Market Oriented						
Market Size	Non-Financial	Companies	Predictive	Market Entry Decisions	BOD, Mgmt, Finance	Q
Project						
Product Development Milestones	Non-Financial	Milestones	Historical/Predictive	Manage projects	Mgmt, Finance, Sales, Product Dev	

KEY
D: Daily
W: Weekly
M: Monthly
Q: Quarterly
S: Semi-Annually
Y: Yearly

Strategic Measures

When asked what measures were strategic, that is, provided insight as to whether or not the strategy was working, the CFO noted that the company really focused on sales results.

> "So we really looked at sales results… Yeah, it was essentially the sales forecast by region, by team. Not so much by product, not so much by product in the 2004-2005 time frame, it was just, 'what's the quarterly sales number? Are we going to get it?' Is it coming out of Europe, the Americas, Asia? Within each region, which team is it coming out of?' And then in the 2005, 2006, 2007 time frame, we started to measure more by product."

As the discussion unfolded, he expanded his original statement and said that the company really focused on a handful of weekly measures that provided the greatest insights into how the business was functioning.

> "So in the last couple of years we lived on headcount, hiring to headcount plan, purchases, and sales. Those are kind of the three metrics we looked at on a weekly basis."

Since high frequency—in this case weekly—measures provide insight into what the business leaders deem vital to success and also indicate where a preponderance of the management attention is paid, the strategic measurement set was analyzed from this point of view.

Weekly Measures

Most of the weekly measures are sales-based. During weekly sales meetings, sales prospects, leads, sales by region, by team, and eventually by product were analyzed. The entire sales organization, the CEO, CFO, Vice President of Marketing, and at times, the head of engineering would participate in the call to get an understanding of order flow from around the world. Also, keen emphasis was placed on hitting the quarterly targets. At the time of the case, Green Zone was a privately held, venture-backed company intent on growing successfully. Thus, sales results were important. As is the case with many technology companies, headcount is a key cost driver, which was why it was looked at weekly as well. According to the CFO, 'everyone

wanted headcount' so hiring and hiring to plan were monitored extensively. Marketing activity, for example, website leads, were looked at weekly, per the CFO, and the company would try to correlate them with sales, but it was never clear that they were able to do this effectively.

Another key weekly measure was product trials. Product trials consist of networking equipment given to prospective buyers to test at their facility. These trials often converted into sales. Over time, this became the primary leading indicator for Green Zone.

> "In terms of the actionable data, I'd have to say the most actionable data was the statistics and the data on the trials. That's something we can look at almost in real time. And the next set of most actionable data was the results against sales projections… And again, we were a growth company; we were not being asked by our investors to produce profits. We were being asked to produce growth. So looking at the Profit and Loss and the bottom line weren't necessarily where we were focused."

Quarterly Measures

Quarterly measures consisted of asset-based measures, such as cash position, cash flow, and inventory. Consistent with the CFO's view, many expenses, and ultimately results, were looked at quarterly, often in preparation for board meetings. The key drivers of results—in this case, sales and the major expense category of headcount--were examined weekly.

Organization of Measures

Although Table 1 shows 10 separate categories of measures, measures at Green Zone fall mainly into two categories: sales- or revenue-based measures and customer measures. Certainly these categories are related. Information outside the organization pertaining to customer activity—from trials and from issues or "bugs" with the product—was monitored by the sales teams and brought back and discussed within the organization. This information was monitored at the top team level and was used to drive decisions pertaining to resource allocation and product development/deployment. These categories correlated with those measures that have a high frequency of use—weekly. Thus sales and customer measures are

monitored at Green Zone weekly and are deemed per the CFO to be among those most vital to the business and most representative of strategic success. Detailed forecasting of sales expectations enabled Green Zone leaders to gauge whether or not their growth strategy was working.

Question 2: What features, roles, and processes comprise strategic performance measurement systems for these firms?

Features

At Green Zone Networks, the strategic performance measurement system consisted of six separate features or elements: a set of performance measures, a set of functional plans, a reporting system, a customer interaction component, performance reviews, and objectives. Each of these is analyzed below.

Set of Performance Measures

As discussed in Question 1, Green Zone Networks utilized a set of performance measures that contained, at a minimum, the 31 measures highlighted in Table 1. From these measures, a subset of high-frequency or strategic measures can be extracted that focus on sales management and customer management.

Set of Functional Plans

Per the CFO, Green Zone created a number of key business plans which included the following:

- Strategic plan
- Operating plan
- Sales plan/sales forecast
- Product development plan/release cycle
- Expense plan
- Hiring plan
- Sales compensation plan

Strategic Plan. Beginning in the fall of each year, Green Zone would develop their strategic plan. The strategic plan was positioned within the context of a three-year

plan; however, there was no evidence that there was a meaningful three-year look at performance. The planning process was annual. The yearly process would commence with the convening of the top leaders in the company—CEO, Vice President of Sales, Vice President of Marketing, Vice President of Product Management, Vice President of Engineering, Vice President of Operations, and the CFO. Over the course of several meetings, a three-year direction would be developed that identified what the sales goals would be by product and market, what the product development and release plan would be, and what the financial or operating plan would be. The final plan represented essentially the assembly of each of the three "legs," as they were known to the CFO. The final plan would be finished by the end of the year although it would occasionally run into the following year. The strategic planning activity was used as a mechanism to get the three major elements of the organization—sales, product management, and finance—agreed on the activities for next year.

> "Well you know, I think a lot of decisions were made in that September to December time frame when we were setting the strategic plan for the coming year. When product management would agree, here's what we're going to build for the coming year and by build I mean existing products, here's what we're going to do to continue or enhance or shut off their development. So sales guys—the stuff you're selling now—here's how it's going to change in the coming year; here's the new things we're going to develop. So the agreement between product management and sales, in terms of that stuff, and the agreement between product management and engineering in terms of what engineering could build, and what the time frame is, and how many people they needed to build it. And then the agreement, you know CFO, CEO, okay here's a plan we can live with. Hire this many people, fill this much stuff, sell this much stuff. So a lot of the decision-making happened when we kind of settled on the plan."

However, the planning process appears to be less strategic than it does operationally focused. Nowhere in the discussion does the CFO mention accessing new markets or acquiring organizations—these decisions appear to remain outside the process.

Operating Plan. In conjunction with the high-level strategic plan, a detailed one-year operating plan was created. This plan was largely the first year of the strategic plan consisting of detailed financial information around sales and expenses.

> "So finance, we would forecast based on what we think we could sell next year and based on how many resources we need, here's what we can afford to do given the goals to stay break-even and kind of keep our cash balances at a particular number. And they we would kind of agree… and we would kind of come up with a financial plan that works."

The operating plan was essentially the detailed resource allocation for the business over the upcoming business cycle. It was reviewed quarterly to ensure the overall financial goals for Green Zone were met.

Sales Plan/Sales Forecast. Vital to the success of the organization, per the CFO, was the sales plan or sales forecast. Becoming more robust as the company grew, at the time of the interview the sales plan had evolved into a highly detailed projection of sales activity by product, service, sales team, and sales region globally. The sales plan served as the basis on which not only to direct the efforts of the sales organization but as importantly to evaluate the efficacy of the strategy.

> "Locking into a good, solid annual sales plan I've found has been helpful for Green Zone."

Product Development Plan/Release Cycle. Developed in conjunction with the sales forecast is the product development/release plan. Like most technology companies, Green Zone is product oriented. Annually, the product management group and the engineering team would discuss and agree on with the balance of the organization the products and features to be built. More often than not, the core or base product would be modified with new features or functionality.

> "Product managers would say, 'we think we're going to see continued growth with these products in these markets or we think we're going to see them flattening or we think we're going to start to see decline. Again from a product management perspective, from a market perspective, here are the other things we think we can do. We can add on these product lines and enhance them. We can maybe wind

> some of these things down and start to build new replacement products.'"

During the year, the engineering team would develop products consistent with the product roadmaps and release schedules. At times the release schedules would be modified based on emerging customer requirements, but in the main, the schedules were maintained and were a key element of the strategic performance measurement system.

Expense Plan and Hiring Plan. The expense plan was developed in support of the overall sales and product development plans after the sales volume and development activities were agreed to. Expenses in the main seemed to be highly predictable and subject to minimal variability with the exception of headcount—the primary cost driver. Although included in the overall expense plan, headcount was culled out and managed separately as one of the key measures in the business.

> "Engineering would want lots of headcount. Sales would want lots of headcount. Marketing would want to spend a lot on marketing. So we'd [finance] get a preliminary look into what resources would be needed to meet the sales plan for the coming year and the product management plan for what they thought the coming year and beyond would be. So finance would build kind of a preliminary model based on what we're hearing, on the sales and expense side."

Sales Compensation Plan. The final functional plan was the sales compensation plan. This quota-driven, incentive-based compensation system was a key driver of sales focus and activity. The compensation plan was developed at the time the strategic plan was created and, per the CFO, remained unchanged throughout the year.

> "The sales guys needed to know what their quotas were, and how they were going to be compensated. I think one thing Green Zone was particularly good at was building a good sales compensation plan. It helped shape the behavior of the sales professionals to achieve the corporate goals."

It was believed that the sales compensation plan drove the activity the company needed in order to drive not just financial results, but strategic results as well. In

addition to the sales compensation plan, Green Zone has a variable compensation program that covers all employees.

Reporting System

In the Green Zone interviews, little was mentioned regarding the design and construction of the reporting system. From the interview data, clearly a reporting system exists because sales progress was reported weekly and financial results were reported quarterly along with progress on key measures and actions for the board of directors.

> "We were assembling quarterly financials and there was no requirement to do anything for that… and while we weren't looking at monthly financial statements, we were looking at weekly and quarterly sales results and weekly hiring against plan."

Another dimension of the reporting system that evolved over time was the capture, tracking, and reporting of product bugs and customer interruptions. Bugs were product issues that had to be resolved by Green Zone. Customer interruptions were customer requests to modify the product for their unique purposes. Both of these customer-centric issues were captured in a reporting system, briefed to key parties—at times senior management for critical interruptions—and ultimately worked on. The key point is that supporting systems were put in place for management of these customer matters.

Customer Interaction Component

The customer interaction component is comprised of sales teams established for the purpose of not only selling to but also staying in contact with customers. Sales teams consisted of a sales representative and a sales engineer—a selling professional paired with a technical expert who could provide technical advice to the customer. The interview data suggests that significant and critical feedback and information was captured from customers by the sales teams. Regarding the decision to design another product—which will be discussed later in the case—the CFO noted the following:

> "The sales guys brought the feedback that customers want this you know internal looking network anomaly detection thing. It ended up

> being called network behavioral analysis. So the sales guys brought the feedback that the customers were asking for this, the engineers heard it, and they said before there was even a strategic decision made, started building some code in engineering, the engineering leaders, the two founders, and the two real senior thought leaders who came to the senior management meetings said, 'Hey, we think we should pursue this.'"

In another case for a different decision, the sales team again proved the catalyst that connected the technical needs of the customer with the capabilities of the organization.

> "You know the sales guy and the sales engineer take on the lead engineers from R&D and have a meeting with the engineers and customer, they get up on a white board and say this is what we're looking for."

Another key mechanism to collect feedback was the customer support function. At Green Zone, Customer Support handled inquiries regarding customer problems with the technology. Straightforward issues—tier 1 as they were referred to—were simple usage requests that could be easily handled by the customer service reps. Tier 2 issues were more challenging technical matters that might require some research. Tier 3 questions were beyond the ability of the customer service area to answer. These were brought to engineering and escalated throughout the organization. But the key point here is that interaction with customers at Green Zone was vital to advancing the products' efficacy.

Performance Reviews

Green Zone held a variety of performance reviews that supported effective organizational functioning. Sales reviews were held weekly and consisted of a review of the pipeline and product sales by each team in each region. The meetings were attended by the top leaders in the organization—the CEO, CFO, Vice President of Sales, Vice President of Marketing, and occasionally Vice President of Engineering. The sales meeting was the first meeting of the week occurring on Monday and other meetings, like the weekly management meeting, were scheduled after this meeting since the information that came out of it was so central to effective management of the company.

Weekly management team meetings were held with the top team at Green Zone on Fridays. Per the CFO, the management team would attend the weekly sales meeting, absorb the information, think about it during the week, and then discuss it again—in conjunction with other matters—at the end of the week.

Initially, financial statements were assembled monthly and then quarterly by the CFO and reviewed with the top team as well as the board. The feeling was that if the major focus areas for the business were on track—sales, headcount, and key purchases—then the financials would fall out from there. Again, the emphasis was growth so there was a lessened focus on profitability.

Three times per year the top team would meet to discuss the progress against the strategic plan. This review was mostly an assessment of how well the overall financial was tracking for the year. Minor adjustments would be made, but the sense was that the sales plan and financial plan would essentially stay intact.

The product plan and the human resource plan were reviewed semi-annually. Again, the expectation was that through ongoing, frequent management of key performance variables, little would need to be changed in either of these areas.

Objectives

The last element of the strategic performance measurement system that was observed was the setting of objectives. Several critical financial objectives were identified as part of the strategic planning process. For instance, the company set targets for the sales volume they expected by region. Eventually this matured into revenue by product and region. As their second major product line—Blaster2—was developed, sales objectives were created for it. Driving the sales team toward the achievement of the corporate goals was deemed to be critical to their success as a growth company. They had objectives for spending levels. The CFO noted that the company did not want to spend below $10 million—their low watermark.

Interestingly, for a period of time the company adopted a management by objective (MBO) system. In the system, each person in the company had to have three objectives, which were evaluated quarterly. They were fed to human resources for review as well. Per the CFO, the objectives were fairly narrow and always included a sales objective or related somehow to the sales forecast.

> "In addition to every person having three MBOs each quarter, we had corporate MBOs. So at the end of each quarter we as a management team would sit down and say how'd we do against the three corporate MBOs. One of them was always the sales forecast. How did we do against the forecast? There was always another couple of soft MBOs like did we get that Mega Telecom sale that we were trying to get? Did we develop that particular set of features that RB3 wanted?"

Even the MBO system was geared toward driving sales as well as customer engagement. Ultimately, the new CEO did away with the MBO system, but even before that time, the sense was that it was highly redundant and much effort for little return. Relative to the other objectives and key measures for Green Zone it was highly duplicative.

Roles

The seven features of the strategic performance management function above supported seven major purposes or functions—roles—at Green Zone: manage strategy, measure performance, manage products, communicate performance, influence behavior, adapt the organization, and detect signals.

Manage Strategy. One of the main roles of the strategic performance measurement system at Green Zone was the management of strategy. Through an annual strategic planning process, the various functional areas within the company met to discuss changes in the market, the needs of customers, specific product plans, and resource goals for the organization. Within this role, the senior management team set the agenda—at a detailed level—for the organization consisting largely of the one-year sales plan, resource plan, and accompanying product plans for the organization. This detailed information was compiled into a formal strategic plan that was translated into a one-year operating plan for the company.

> "We were calendar year end and sort of in the fall of any given year we would start to say, 'Okay, what are we going to do next year?' The process was driven by the senior management team…"

The strategic plan was then reviewed formally three times per year, although the key aspects of the operating plan were looked at as often as weekly.

> "So after the first-quarter results were in and we were halfway through the second quarter and we were starting to feel how the second quarter was coming, we would have a checkpoint and we would ask, 'Are we on track for the year or not?'"

Decisions were made within the context of the strategic planning, which was deemed to be some of the most critical for the organization.

> "Well you know, I think a lot of the decisions were made in that September to December time frame when we were setting the strategic plan for the year. When product management would agree, here's what we're going to build for the upcoming year…"

Decisions were made outside the planning meetings, often times during performance reviews with the board of directors.

Measure Performance. The strategic performance measurement system at Green Zone was integral to the measurement of performance. Although the company did not differentiate between strategic and any other types of performance, a key subset of the measures was the handful of strategic performance measures that were examined with high frequency.

> "So in the last couple of years we lived on headcount, hiring to headcount plan, purchases, and sales. Those were the kind of metrics we looked at on a weekly basis."

Performance was measured with varying frequency; however, these critical performance variables were evaluated most often. Other areas of performance were reported and evaluated quarterly or semiannually.

Manage Products. Green Zone was a growth company at the time of the interviews and growth was driven from products. The company had two networking products at the time—Blaster and Blaster2—which were being managed using an overall product management plan and product roadmaps. Thus, growth in sales and relevancy of products were linked directly to effective product management. This

role then was central to the success of the company and constituted a major dimension of the strategic performance measurement system. Product plans were followed carefully throughout the year but were changed or interrupted based on immediate and significant customer needs. Roadmaps needed to be set in advance of the year but had to be flexible enough to accommodate changes during execution.

> "All technology companies, the roadmaps are defiant, that deadlines are set and there's always interruptions. Roadmaps, deadlines are always under stress. Engineering sometimes falls short, they take features out to meet a deadline or they break a deadline. There's always that push and pull, there's always that stress."

Information that was captured in the product issues systems was also an element of the strategic performance measurement system.

> "Also, a lot of feedback came through the customer support function and the bugs that were reported and the problems customers were experiencing. We did a pretty good job of making sure that the information that the customer service folks were gathering was getting filtered back to engineering. It was almost by necessity. We had our own home-grown system called, we called it Bugtracker, our own little home-grown database for gathering all of this information so engineering could look at it and track what they determine the problem to be and how they fixed it."

Thus, product management role was dynamic in nature and allowed for overall product governance of the organization.

Communicate Performance. Information from the measures relative to the sales forecast and budget, data from product management roadmaps and issues systems, progress against the hiring plan, and feedback from the sales organization were shared throughout the company and served to effectively communicate performance on all the key strategic variables in the company. The performance of the organization was regularly communicated by a variety of means: the annual planning process; weekly, quarterly, and semiannual meeting schedule; presentations given to the board of directors; management of all the functional plans; and review of overall objectives, the performance of the organization was regularly communicated.

> "And those guys [investors] would come into the board meeting and we would do the formal presentations and show the trial successes and the financials and give them a little background on the marketing and all that kind of stuff. And then they would say, 'Alright enough slides. Turn the projector off.' And then they would just start talking."

On every occasion where performance was discussed, such as in the board review above, that discussion was informed at least in part by information that came from the strategic performance measurement system.

Adapt the Organization. During reviews of performance, decisions were made that adapted the organization itself. In the case of the sales performance, changes were made routinely to accounts to be targeted and in some cases markets to be penetrated. Feedback from customers was injected regularly into the product roadmaps and changes were made on an ongoing basis that changed the products' functionality to be more in line with customer needs. Information that flowed to the board level was used to benchmark performance and ultimately make decisions pertaining to key markets. Thus, the strategic performance measurement system played a key role in helping the organization adapt to changing market conditions, customer needs, and overall performance expectations.

> "So the sales guys brought the feedback that the customers were asking for this, the engineers heard it, and they said before there was a strategic decision made—'Hey, we think we should build this.' And then it was validated by the board when they thought, 'Well, it's not a big enough market space on this other side, let's go ahead and pursue it.'"

This specific quote pertains to the decision to move into what was called the enterprise space or develop a new product offering for enterprise customers.

Detect Signals. An important role played by the strategic performance measurement system at Green Zone was the detection of signals from the environment. Signals are pieces of data or information from the environment—typically external—that make the organization aware of explicit or implicit threats or opportunities. In the case of Green Zone, interview data showed that the signals

were strong in nature—mostly customers asking for a certain product feature or function from the company that it didn't have. It was the strategic performance measurement system—the sales teams and reporting of customer issues—that provided the mechanism to both identify the signal and advance it through the hierarchy in the organization.

The example given the section entitled, *Adapt the Organization,* is an instance where data from outside was picked up by the sales team and brought back for further development. Another instance is seen where the signal came from a request for proposal (RFP) directly.

> "Well, to go back to the beginning, the most critical piece of information was an RFP from TrustCo we responded to. TrustCo was looking for a network solution to help them with a problem that every company has in their network and we were trying to sell them Blaster2. We responded to it. As companies tend to do, we tried to tailor our response in the RFP to our products. And they were very interested in it. It looks like it's a great product and it's interesting but what you're saying doesn't really fit the pain we're feeling. We're feeling this pain. This internal stuff that's going on in our network that we just don't have the visibility on. And that was kind of a catalyst. Then one of our technology leaders went back and said, 'I know exactly what they're talking about, I can build it.'"

Influence Behavior. The strategic performance measurement system was used to influence behavior in the organization. Once aspect of this was behavior related to sales activity. Created in conjunction with the sales plan were sales quotas and an incentive compensation scheme that focused the sales energies on driving organization growth.

> "It helped shape the behavior of the sales professionals to achieve the corporate goals. So it was important for us to have a strategic plan in place so we could really build the compensation model. That kind of then drove what happened."

Another area was influence from the board and top management. During board meetings, the investors would guide the managers toward actions that would advance their aims in company ownership, but it was based on information

emerging from the strategic performance measurement system, namely the slow achievement of growth goals.

> "So that was happening kind of inside the company from the technologists who were seeing this pain expressed from customers in seeing this opportunity to go build something else and then the more senior managers and board members were saying, 'Are we in a big enough market? Let's start an enterprise product because that's a much bigger market. There's 5,000 enterprise companies out there.' So that's what sort of launched that decision."

Process

Seven key activities comprise the strategic performance measurement system at Green Zone Networks. The details and dimensions of each process step are presented in the Table 2.

Table 2: Green Zone Networks Strategic Performance Measurement Process

Step	Description	Participants	Inputs	Outputs	Devices
Develop Strategy	Actions taken to identify products, markets, sales and resource goals	CEO, CFO, VP Sales, VP Marketing, VP Engineering, VP Operations	Market Information, Customer Information, Prior Plans	Strategic plan for the current year	Strategic Plan
Develop Functional Plans/Forecasts	Creation of plans for sales, operations, human resources, engineering and product management	CEO, CFO, VP Sales, VP Marketing, VP Engineering, VP Operations	Strategic plan information	Functional plans for the current year	Functional Plans, Budget, Product Roadmaps
Interact with Customers/Market	Ongoing interaction and communiction with existing and new customers to advance and sell products.	Sales Teams and Selected Engineering Resources	Customer inquiries and customer issues	Solutions to customer problems and new product features	Product Roadmaps, Customer Issues
Manage Products	Active and ongoing management of scheduled and ad hoc product improvements and releasees.	Varies.. Can include CEO, CFO, VP Sales, VP Marketing, VP Engineering, VP Operations	Product performance information and customer requirements, customer issues	Updated roadmaps	Product Roadmaps, Customer Issues
Measure Results	Collection of actual performance data relative to forecasts and budgets	Top team and related functional leaders	Forecasts and collected data to performance forecasts	Updated forecasts and financial statement outputs	Forecasts, Budgets
Evaluate Performance	Comparison of actual performance to forecasted performance and determination of variance sources	Top team and related functional leaders	Forecasts and collected data to performance forecasts	Unknown	Forecasts, Budgets
Make Decisions	Based upon the evaluation of performance, making decisions to improve performance relative to plan.	Top team	Internal performance data and external performance information	Actual Decisions	Unknown
Step	Timing/Frequency	Forum	Duration	Supporting Technololgy	
Develop Strategy	June - December/Annual	Top team meetings	6 months	Unknown	
Develop Functional Plans/Forecasts	June - December/Annual	Top team meetings	6 months	Unknown	
Interact with Customers/Market	Ongoing	Sales meeting	Ongoing	Bugzilla	
Manage Products	Ongoing/Quarterly Reviews	Ad Hoc	Ongoing	Bugzilla	
Measure Results	Sales-weekly, Headcount-weekly, Financials-Quarterly	Sales meeting, Management Meeting, Board Meeting	Ongoing	Unknown	
Evaluate Performance	Sales-weekly, Headcount-weekly, Financials-Quarterly	Sales meeting, Management Meeting, Board Meeting	Ongoing	Unknown	
Make Decisions	Ongoing	Sales meeting, Management Meeting, Board Meeting	Ongoing	Unknown	

Question 3: What contextual factors affect the design of strategic performance measurement systems in turbulent settings?

For purpose of analysis, there are two dimensions of context that were used to analyze factors that affect performance measurement systems in a turbulent environment—internal performance context and external performance context. Internal performance context consists of antecedents, structure, leadership, frames of thought, culture, and politics. External consists of economic factors, political factors, business issues, social concerns, and technological changes.

From the interview data, at Green Zone five factors—three internal and two external—were identified that affected the design of the strategic performance measurement system. For purposes of understanding the effects of contextual factors on the strategic performance measurement system, it consists of the following six activities: strategy development, budget development, forecasting,

performance measurement, performance review, and incentive compensation (de Waal, 2007)

External Factors

Technology Changes. At the time of the interviews, Green Zone was not different from other technology companies in that the technology they were building was undergoing change. In the case of Green Zone, the change was not dramatic or discontinuous but rather steady and identifiable. The product managers along with the company founders maintained marketplace awareness related to technology developments. The founders were full-time faculty at a major research university who kept pace with the literature and developments in the academic and commercial arenas.

> "The two founders of the company, who were actively still involved in the company, still reside in the engineering function in Capital City near the university. All of the thought leaders were in a sense in engineering and product management."

These thought leaders—along with the product management function—would also assess the changes in the technology market and annually build them into the product set.

> "The other leg of the triangle was product management. They'd come to the meeting and say, 'Well here's what we think'; again this was still emerging technology, the markets for this were emerging, product management would come and say, 'Well here's what we think the markets want to buy.'"

The activities of the engineering function and the product management function would serve as surveillance mechanisms to orient, observe, and collect information to be brought back and incorporated into the actual physical mechanisms and subsequent conversations that informed the actions within the other activities of the strategic performance measurement system.

Customer Requirements. Another critical external factor, more important than technology changes brought about from the broader market, was changes directed by customer requirements. The interview data was replete with examples where

customer requirements or customer feedback was gathered, analyzed, and then used as the basis for decision-making and action within the organization. Examples include specific requests from customers via requests for proposals, problems or issues stemming from product functioning, comparisons to competitor products with more robust or different technology, and needs based on changes in infrastructure. The following quotes capture each of these. Specific to new technologies, Green Zone changed product features based on customer input.

> "And there was this type of network security called Intrusion Prevention (IPS). And the Network Behavioral Analysis (NBA) thing was kind of at the periphery of IPS. The Intrusion Protection market was very big. And a lot of our customers were saying, 'It's great you have Network Behavioral Analysis for Blaster2. The product is great. But we're not seeing the Intrusion Protection features in it we'd like to see.' And so we went and we looked for a small acquisition."

> "And as we were pushing our Blaster2 product to the outer edge of the provider networks, our customers were asking us to give them more visibility into the varied details of what they were seeing. And in order to do that you need to open up the packets and look at every bit and bite that's in there. The Blaster2 product line doesn't look at everything. So we had to go get this deep-packet inspection technology."

Related to new ideas around products, Green Zone engaged in grass-roots co-development with customers, the kind that can only come from close interaction with customers.

> "You know the sales guy and the sales engineer take on lead engineers from Research and Development and have this meeting with the engineers and a customer. They get a table up on the whiteboard and say, 'This is what we're looking for.' I'm not sure a formal customer satisfaction survey really will pick that up."

Organizational decisions were also dictated to some degree by customers, as in the case of expanding the sales force and sales target focus to Europe.

> "We got pulled there by one big customer—New Euro Telecom. They were an early adopter of our technology and they had heard about our stuff and said, 'Hey, we want to try your thing.' We sent a sales guy over to the United Kingdom and plugged it in and they loved it and they bought it. We then hired a sales guy there and had tremendous success with New Euro Telecom and in Europe. They were really early adopters, a leading-edge company."

The strategic performance measurement system at Green Zone differs from mainstream performance measurement systems in that there is an interactive element related to customer interaction that is present, highly active and influential with respect to decisions within the organization. The data are not captured in a measurement system or forecast directly, but feedback from this information source is used to impact these tools. However, unstructured information is used as the basis for critical decision-making.

Internal Factors

Within the internal firm context, three factors were identified from the interview data that influence the design and functioning of the strategic performance measurement system: top management aims, board of director aims, and the culture of the company.

Top Management Aims. A significant influence on the company's strategic performance measurement system was the management team since they were responsible for its overall design and functioning. Per the interview data, the top management team drove the planning calendar and led the strategy development step.

> "The process [strategy development] was driven by the senior management team, which was led by the CEO, the Worldwide Sales Leader, the Marketing Vice President, the Product Management Vice President, the Engineering Vice President, the Vice President of Operations, and myself, the CFO."

Reviews of the strategy were also driven by the top team in various forums that best met their information requirements.

> "So sales meetings were held every Monday and I went to those, the CEO went to those, the head of marketing went to those, the head of sales, and the head of operations. We actually used to have a management meeting—we would go in a different room and have a management meeting, and then we'd go down to the hall and have a sales meeting. And then we kind of changed it so that we would all go to the sales meeting on Monday to figure out what was going on and then the management meeting would be on Friday or later in the week."

And ad hoc structures were established to handle the dynamic needs of the business.

> "For the big ones [decisions] we would pull the whole management team together. For big ones we would because sometimes it would impact the marketing plan if we were going to spin something differently in marketing. It would impact the operations folks."

But in the main, each element of the strategic performance measurement system was impacted by the management team's information requirements, which at for Green Zone was focused on growth.

> "It would start [the review process] with us just looking at sales results. We would do a great job planning sales projections by a region, by a team, by product sales quotas, and then we would measure our success against that. So everybody would look at sales."

These quotes reflect how management—and their desire to drive a specific strategy growth—impacted the design and functioning of the strategic performance measurement system.

Board of Director Aims. Another factor affecting the strategic performance measurement system was the aims of the board of directors. During the observation period, Green Zone had several different venture-capital investors involved with the company, including Charger Ventures and Ronald Romen. Both firms strongly influenced the company and the focus of the strategic performance measurement system. Overall, the goal of any equity investor is to grow the initial investment to garner significant returns. With venture-capital investors, the time horizon can be

long but the aims are consistent—substantial payback through some type of liquidating event. As the company grew, there were concerns about the market size, which impacted the product set. From the founding of the company all throughout growth, the investors impacted critical strategy development activities.

> "The new money guys came in and said, 'Is that enough?' And we went into a different market. That was in the middle of 2002 and at that point the engineering guys started mocking up the Blaster2 product."

As is clear from the measures anlaysis, the focus of the strategic performance measurement system was sales and sales growth. This was impacted directly by the board of directors and their growth agenda.

> "Again, we were a growth company, we're not being asked by our investors to produce profits. We're being asked to produce growth. So looking at the profit and loss and the bottom line weren't necessarily where we focused."

Strategically, not just product was impacted but markets too. On accessing the government sector—which Green Zone tried and failed at twice—the board of directors were central to the decision.

> "They would give us their impressions from what they've seen in the marketplace in their other portfolio companies. And that's where some of this data came from. 'The service-provider market isn't big enough; you need to find another market, go get enterprise. We're a security company; we've got to be in the government. Go after the government.' The board actually didn't advocate international expansion, that kind of came from management. They would bring a lot of these ideas to the table. And we would take that into our planning. I think in early venture-backed companies, that's the way it works. The CEOs that are hired have their own ideas and the CFOs and the other leaders have their own ideas on how to do things, but the board, the venture boards are very influential in the early years."

So the elements, stages, and content, such as measures and incentive compensation scheme, are driven significantly by the board.

Culture of the Company. The final factor that influenced the design of the strategic performance measurement system was the culture of the company itself. A byproduct of the management team, which at Green Zone included the company founder, as well as the board of directors, the culture embodies the norms and behavior evident in the internal environment. Green Zone was a technology-based growth company at the time of the interviews. Their products were pushing the edge of the marketplace in that they were largely new and being employed for the first time by their key customers—like New Euro Telecom. This contributed to the products being designed and adapted as the business grew. The strategic performance measurement system mirrored this design and adapt approach. But the strategic performance measurement system was impacted by what might be termed the "tech growth company culture." When the board directed the company to expand the products into the enterprise market, the company eagerly accepted the challenge despite being resource constrained to manage two products simultaneously.

> "And that always felt like a big chore for Green Zone, a little company, to be running two separated product lines. We continued to do it because we felt strategically we needed to be in two places to give ourselves more market opportunity and I also think internally the technologists really wanted to build this other thing."

Related to the same decision, the spirit of the company took over in what may have been a poor decision for the company ultimately.

> "The fear was that we were going to dilute the core product, the Blaster product. But the entrepreneurial, growth-minded spirit took over and said, 'Well, that's just a risk we're going to have to take.'"

The interview information strongly suggests that the company's high-risk fervor had a significant impact, causing Green Zone to focus on product development and sales regardless of constraints. Further, the growth and exit requirements of the investors placed a premium on scale, which again translated into sales. Overall, the impact of the culture of the company on the strategic performance measurement system was focus on customer growth, sales, and new products.

Question 4: How does a strategic performance measurement system inform strategic decisions in a turbulent environment?

To understand how the strategic performance measurement system functioned at Green Zone, three separate decisions were examined. The first decision was to expand into a new product called Blaster2. Until the time of the change, Green Zone focused exclusively on what was known as the service-provider market—essentially, telephone and Internet-based providers, such as New Ero Telecom and Access America Internet. The second decision was to expand sales into international markets moving to Europe first and then to the Asia Pacific region. The final decision was the expansion into the government space. The purpose of the analysis is to understand the process of how the strategic performance measurement system functioned to inform the decision. Table 3 presents the details pertaining to each decision.

Table 3: Decision Information—Green Zone Networks

Name	Description	Decision Type	Complexity	Main Information Source	Key SPMS Process Elements Used
Blaster2	New product focusing on enterprise market.	Product	Medium-High	Marketplace information--specifically potential customer requests--for a product to help manage challenge with networks such as work propogation and network access.	All elements used especially Interact with Customers and Develop Forecasts
International Expansion	Shift sales from US domestic market to overseas.	Market	Low	Key customer British Telecom requested their products for use in the United Kingdom.	Mainly Interact with Customers, Develop Forecasts, Measure Results, Evaluate Performance, Make Decisions, and
Government Entry	Sales effort to access the U.S. Federal government market	Market	Medium	Board of directors input and business connections of the company founders guided the decision.	Largely measure results, evaluate performance and make decisions.
Name	**Participants**	**Duration**	**Satisfaction**	**Effects**	**Decision Criteria**
Blaster2	Board of Directors, Management and Product Management	1 year 2002-2003	Low	The product was tested with customers first to see if they would accept it. When they did, the company made an effort to access the market fully despite not have the sales and distribution capabilities to do so. They ended up refocusing on the service provider market after sales were less than expected and the service provider market proved larger than originally understood.	Decision was based upon perception that the service provider market--the key existing market--was too small.
International Expansion	Management	6 months late 2001-early 2002	High	Within three years 40% of the company sales were coming from outside the domestic market.	Decision was based upon the desire to scale sales and the needs of a specific customer.
Government Entry	Board of Directors and Management	First attempt 2002-2003, Second attempt 2005-2006	Low	Arbor tried to access the Federal Government market twice based upon input from the Board of Directors. On both occasions the company failed to fully commit to the effort, understand the market opportunity and exited unsuccessfully each time.	Decision was based upon the desire to scale the sales of the company through accessing an untapped segment.

Each of the three decisions is discussed, with particular attention to the key strategic performance measurement system process elements engaged during the decision.

Blaster2

Green Zone Networks was founded on a network security product designed specifically for large cable companies and Internet service providers (what the company calls service providers). The product Blaster enables monitoring of network traffic in order to provide visibility into detection of anomalies and other malicious activities potentially harmful to the network's continued service. Additionally, Blaster helps ensure smooth routing of traffic through the network by

tracking the flow of packet traffic around the network. The decision was made to start the development of a second product designed for what Green Zone referred to as enterprise customers—companies such as TrustCo Investments, Big Lumber, and other major U.S. corporations that do not provide external service, but instead run large networks internally for their own computing needs.

The decision to make a new product for the service-provider market emanated from a series of customer requests, and specifically the request for proposal from TrustCo Investments.

> "The most critical piece of information was an request for proposal from TrustCo. TrustCo was looking for a network solution to help them with problems that every company has in their networks and we were trying to sell them Blaster. When we responded, we realized they were feeling this other pain—internal stuff going on in their network that they just didn't have visibility into. And that was a kind of catalyst."

The technologists—excited that they had a solution in mind for this—decided to start building the product. At the same time, the board of directors and management were looking at the service-provider market overall, and based on the slower than expected growth, thought the enterprise market offered an excellent opportunity.

> "So that was happening kind of inside the company from the technologists who were seeing this pain expressed from customers and seeing this opportunity to go build something else and then senior management and board members were saying, 'Are we in a big enough market? Let's start an enterprise product because that's a much bigger market—there's 5,000 enterprise companies out there.'"

This decision was started in 2001 when the realization set in that enterprise customers wanted a different solution than that of the service provider market. The company took another round of financing in 2002 and then started to slowly plan and forecast entry into the market during 2003.

> "Once we got a little bit of customer interest in an actual product that had been sort of mocked up, that's when we said, 'Alright we've got

> to plan for this.' That came in 2003. So we sat down to do the 2003 plan, we divided the spreadsheet in half. Sales projections for this other product line and hiring salespeople to go sell it, allocating marketing budget to go to market for it, and we actually split engineering at that point to put somebody on Blaster2 versus Blaster."

As Green Zone began to execute, they continued to move more resources over to Blaster2 and evaluate results. They put trial equipment out with customers—another customer-oriented sensing mechanism to see how adoption was tracking—and they found the adoption rate to be slower than forecasted.

> "Maybe we sold $500,000 the first year and then $1 million and that went to $3 million. Compared to Blaster that was pretty slow growth. As we got three years into it, we said, 'Oh boy, this is supposed to be a bigger market space.'"

So the actual performance compared to projections was smaller than anticipated. At that point, the company evaluated trying to change their distribution model, but they saw it as too complex an undertaking so they began to shift resources back to their service-provider product—Blaster2.

> "So we decided, 'you know what? We've got to stick to our knitting. We've got to go back to the service-provider product line.' And now there's all of this growth opportunity that had become obvious to us, at the edge of these provider networks, let's go expand there."

Following this decision, Green Zone acquired Cortona to accelerate the development of the Blaster2 product that had fallen behind due to the emphasis on the enterprise product.

International Expansion

As Green Zone began to grow domestically, opportunities arose to access international markets. As was the case with the first decision, the opportunity to enter the international market—Europe specifically—came via customer request. New Euro Telecom, which ran a large service-provider network, had heard of Green Zone's technology and asked the company to provide them with a demonstration.

Green Zone sent a company representative to the United Kingdom from the United States to provide them with a trial. New Euro Telecom found the technology well suited to their needs and immediately purchased it. Green Zone management—seeing this as a small piece of a broader opportunity at New Euro Telecom and in Europe overall—sent a sales representative to the United Kingdom to organize a broader sales effort. This effort played out over several years as Green Zone expanded throughout Europe, Asia Pacific, and South America.

> "New Euro Telecom probably called in 2001. We really got cooking with them in 2002. We sent some people in from the U.S. over in 2001 and started hiring some people in the United Kingdom in 2002."

The decision was rapid and not particularly analytical in nature. Consistent with the first decision, the governing criterion was sales growth.

> "So that early customer that called, we didn't really convene and stop everything else to go there. We just went and did it."

Green Zone continued international expansion into 2003. Other regions of the world were added in a more deliberate manner as the expansion was built into the annual strategic planning process.

> "Well it was over the next two years. So during 2003, we said, 'Let's add a couple of guys in Germany.' That became part of our planning. Then it continued to play out [over the next few years] and we added more in 2005. Usually, you add a sales engineer and if that goes well, a sales person."

As Green Zone began to create a presence around the world, the volume of sales from outside the United States grew considerably. The key indicator of performance in this instance was sales results. Using those simple metrics, the decision was highly successful.

Government Entry

Green Zoner Networks was founded as a security company and then broadened their positioning over the years into a network monitoring and security company. Their technology provides security to organizations that run large networks to ensure their

safety from outside attacks, such as worms that cause disruptions in service (DoS attacks) or loss of data. The founders of the company had existing relationships with senior leaders at Defense Advanced Research Projects Agency rom their own research. As the company was growing, they contacted these leaders and asked them if there was any interest in trying Green Zone's technology. At the time, the U.S. government was still reeling from the effects of the September 11th attacks, so concerns regarding security were heightened and there was a belief that a significant market existed. The decision was precipitated largely by the board of directors. The time between when it was raised and executed on was very short.

> "So of course, everybody at the board level said we're a security company, we have to be in the government. Homeland security and everything. Just a gut reaction from everyone. Okay, Rajat [company founder] has some connections in the government let's go try and it. So we went and hired a guy and we started to sell a few things in the government. It was mostly pilots. This was in 2001. We almost hired this guy right away. As soon as we had the idea, we hired the guy. Maybe a couple of months."

Green Zone hired a manager to penetrate the federal government. Over the course of the next two years, they were able to sell a small number of pilots to government organizations. However, by the third year—the end of 2003—Green Zone became dissatisfied with his performance and the government business overall and terminated him. The board continued to inquire and they again began an effort to penetrate the market.

> "And the board said, 'what are you doing about your government approach? You can't just let it go.' So we went we hired another guy. Another year went by and we didn't do anything in the period; there was one big government sale but it turned out they really didn't want what we sold. As a management team, we kind of came to the conclusion that this whole thing about government buying cycles became very obvious. You can't get into the cycles and you know the game if you don't put in enough resources. So we sort of came to the conclusion that we don't want to do just government, we were not big enough to put all of these resources into government at all the cycles properly so we kind of took ourselves out of it."

So after two attempts, Green Zone pulled out of the government space unsuccessful. The strategic performance measurement system elements used were the forecasted financial, measures of performance around product trial, and sales and decision making largely by the board of directors and management.

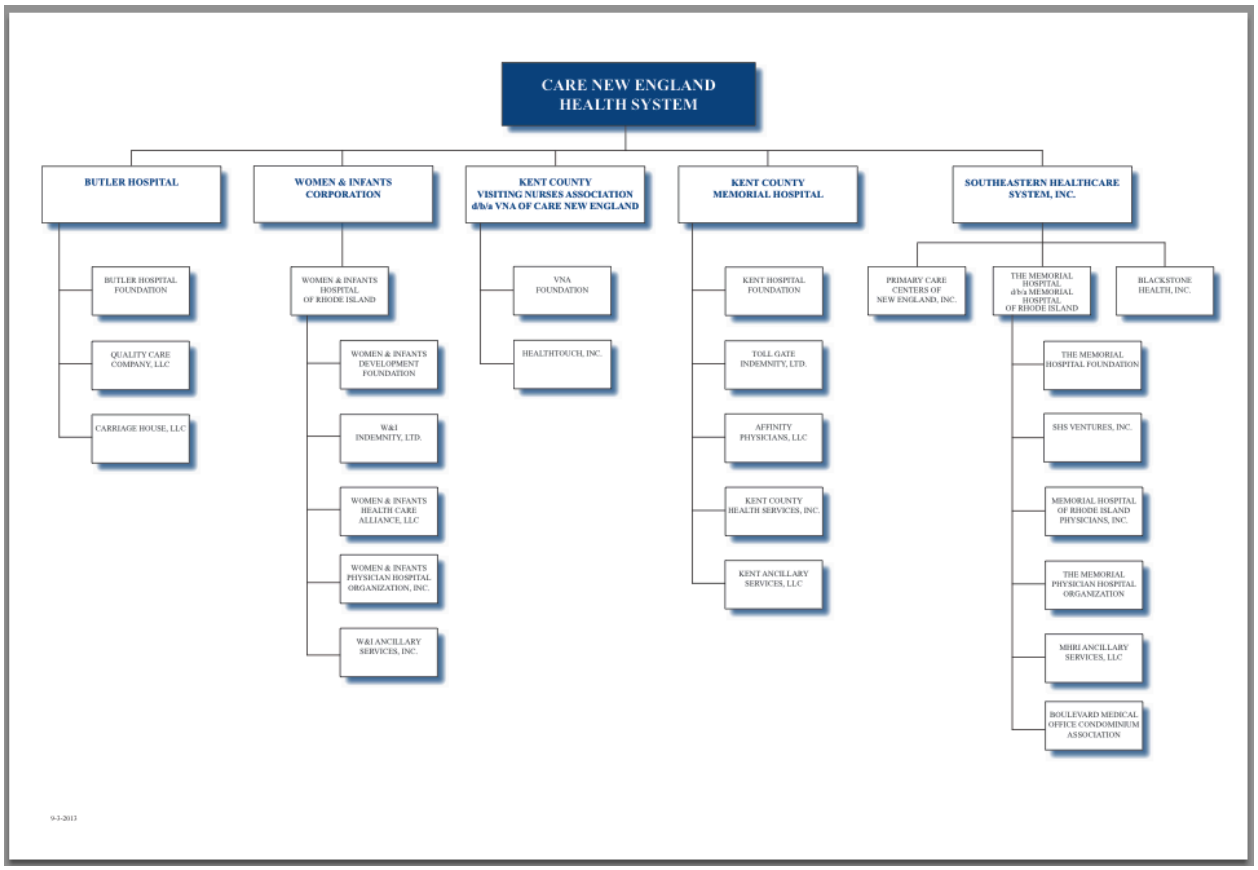
How the strategic performance measurement system operates: Commonalities

Overall, the process steps of the strategic performance measurement system in Table 2 informed each of the three decisions, but to different degrees. The first two decisions were brought about by customer information gathered, understood, and acted on by the company. The actual decisions themselves were made by indirect reference to sales information from another key process step—develop forecasts. The decisions process used appeared to be highly informal and not directly related to immediate data from the strategic performance measurement system. Regardless, it seems clear that a mechanism to capture customer information, even though unclear, is a key feature of the process. Further, the sales forecast is a major driver of focus and behavior at Green Zone. Managers at all levels responded to the concept that Green Zone is a growth company focused on driving sales.

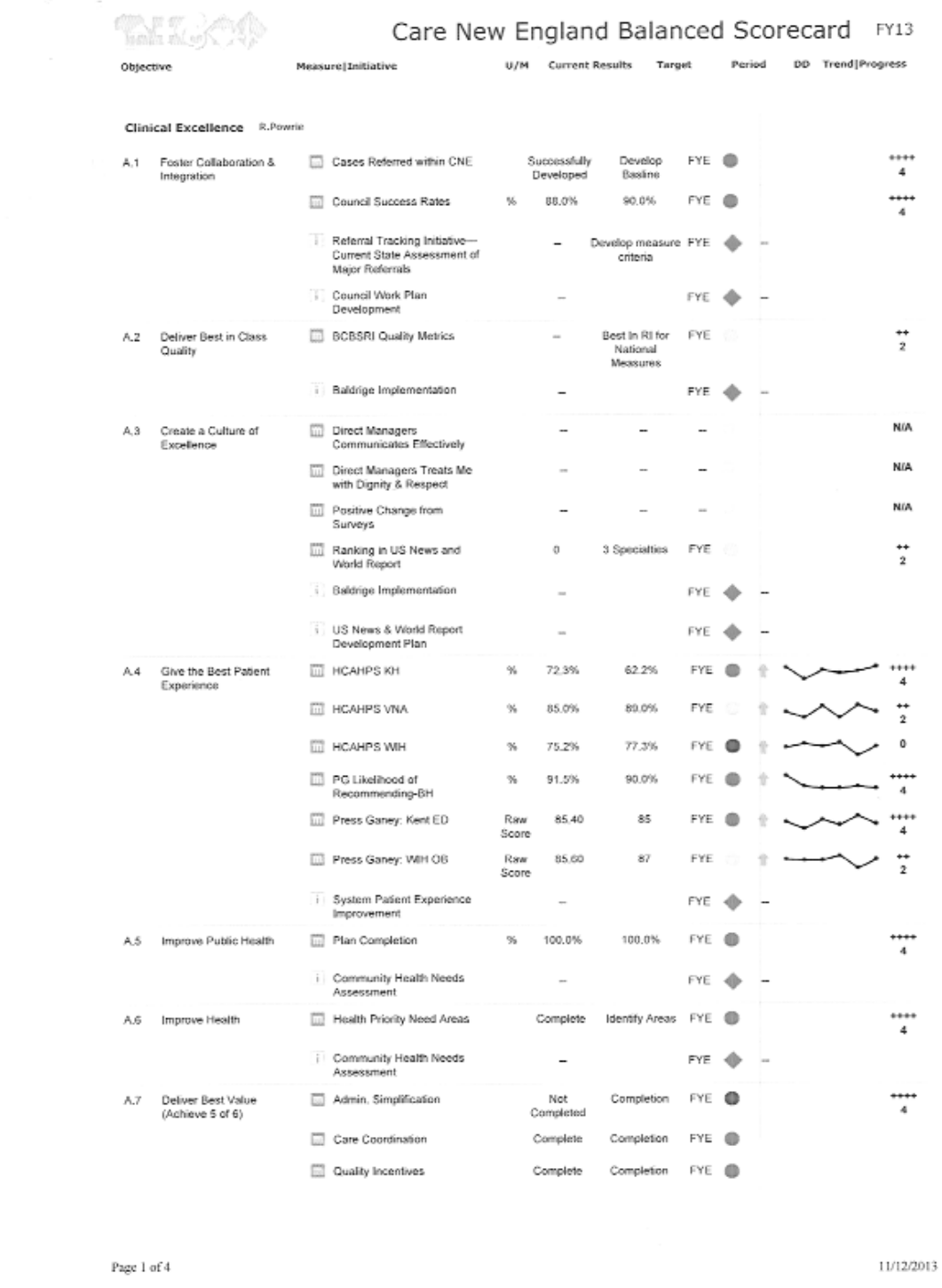
How the strategic performance measurement system operates: Differences

Although the parts each appear to be of value in informing the decision, the sequencing and employment of each process step is significantly different. The first decision employed all steps during the decision analysis. Each step played a significant role in informing the decision and the actions needed to expand the product set. The second decision utilized two key dimensions—customer information and the sales forecasts—in the decision. The decision was almost entirely a rapid response to customer information in the context of what was occurring in the area of sales growth. The last decision was driven by the board based on little more than their own intuition. It is not clear how the using (or not using) the strategic performance measurement system affected their decision except perhaps indirectly.

6.6: Care New England Organization Chart, September 2013



6.7: Care New England 2013 Balanced Scorecard Excerpt



Care New England Balanced Scorecard FY13

Objective		Measure|Initiative	U/M	Current Results	Target	Period	DD	Trend|Progress
Clinical Excellence R.Powrie								
A.1	Foster Collaboration & Integration	Cases Referred within CNE		Successfully Developed	Develop Baseline	FYE		++++ 4
		Council Success Rates	%	88.0%	90.0%	FYE		++++ 4
		Referral Tracking Initiative—Current State Assessment of Major Referrals		–	Develop measure criteria	FYE	–	
		Council Work Plan Development		–		FYE	–	
A.2	Deliver Best in Class Quality	BCBSRI Quality Metrics		–	Best in RI for National Measures	FYE		++ 2
		Baldrige Implementation		–		FYE	–	
A.3	Create a Culture of Excellence	Direct Managers Communicates Effectively		–	–	–		N/A
		Direct Managers Treats Me with Dignity & Respect		–	–	–		N/A
		Positive Change from Surveys		–	–	–		N/A
		Ranking in US News and World Report		0	3 Specialties	FYE		++ 2
		Baldrige Implementation		–		FYE	–	
		US News & World Report Development Plan		–		FYE	–	
A.4	Give the Best Patient Experience	HCAHPS KH	%	72.3%	62.2%	FYE		++++ 4
		HCAHPS VNA	%	85.0%	89.0%	FYE		++ 2
		HCAHPS WIH	%	75.2%	77.3%	FYE		0
		PG Likelihood of Recommending-BH	%	91.5%	90.0%	FYE		++++ 4
		Press Ganey: Kent ED	Raw Score	85.40	85	FYE		++++ 4
		Press Ganey: WIH OB	Raw Score	85.60	87	FYE		++ 2
		System Patient Experience Improvement		–		FYE	–	
A.5	Improve Public Health	Plan Completion	%	100.0%	100.0%	FYE		++++ 4
		Community Health Needs Assessment		–		FYE	–	
A.6	Improve Health	Health Priority Need Areas		Complete	Identify Areas	FYE		++++ 4
		Community Health Needs Assessment		–		FYE	–	
A.7	Deliver Best Value (Achieve 5 of 6)	Admin. Simplification		Not Completed	Completion	FYE		++++ 4
		Care Coordination		Complete	Completion	FYE		
		Quality Incentives		Complete	Completion	FYE		

Page 1 of 4 11/12/2013

6.8: Project 3 Sample Interview

INTERVIEW WITH CARE NEW ENGLAND EXECUTIVE

What's the level of change taking place in the external environment?
It's very high, it's extremely high. I don't know, all the changes really hit the ground. People talk about payment reform and things like that right now. The truth is it's largely a fee-for-service world. The reason that's important is that the doctors, they've got to do something. So the physicians are realigning just because of the health reform changes; they want to be employed and they know they're very concerned about that. Now these payment reforms about to take hold—bundled payments and global payments. We need to build some capability in those areas; we need to experience that. So that's going to take a substantial amount of change. Things that were formerly revenue are now expenses. So I think there's a tremendous amount of change, very high.

What are the major drivers of change?

Payment reform is number one—movement from a fee-for-service world to a global budget world. I don't think it will be 100% but the point is a lot of money is now going to be put at risk by us having to manage the population. I think that's number one—that's important because they're very low—hospital margins now, that's key. We as a system not totally prepared to manage a population. But we've got to given what's going on with the cost of health care, and it's got to come down to more like the standard inflation rate. I think payment reform would be number one; number two is the patient is better educated. Ten or 15 years ago they would take your word on something. But now they have different data sources; some accurate, some not. I'm must say, if you want to find out where to get your knee replace, there's accurate data out there. So I think these educated patients are more demanding, and it's got to the point we become responsible for the budget. It was easier to manage this kind of patient on our budget if it were 10 years ago. Not that you would do any bad for a patient, but they were not as up to speed and as demanding. It's a good thing for the health population, but it's more demanding. The third thing is the war for medical talent; it used to be nurses but that has settled by looking overseas. It's more about doctors—it's totally different—it's a real, real war for doctors, both with established practices to align the doctors and new specialists, particularly primary care doctors. So, a very fierce war for talent, for medical talent, particularly the area in the East that is highly competitive.

Given those drivers of change—payment reform, patients' knowledge, scarcity of physicians—how well aligned do you think the goals and objectives of Care New England are with those drivers?

I think well aligned. I think some of the things we talked about in terms of gaining expertise and experience and novel payment mechanisms, that's great. Some of the more physician friendly environment, there more high-level decisions the operating level is a real plus. The emphasis on efficiency and staffing standards and flexing up and down is all very important. The question in my mind is really whether those changes put into place are going to be able to accomplish fast enough, whether we're going to be able to gain experience fast enough in things like population health management for example. To give you an example, we have a heart failure bundle project, were trying to the data back from that, that's data that unfortunately doesn't count because the physician program began January 1st. We would've lost up to a million dollars last year on this little heart failure bundle project for 500 Medicare patients with heart failure that come into our hospital. That's a lot of money. A lot of it has to do with readmissions and the fact that they went to another hospital. I'm concerned about the rate of change; it might be taking too long. The direction is correct; the competence we're trying to build is correct; but it's the rate of change, the speed. I don't think we have five years; I think it'll be like two.

And how about for the performance measures you use, do you think the performance measures are the appropriately aligned with the drivers of change we discussed?

They are, yes. But they're not perfect, and I would say one of the reasons they're not perfect is we're not able to get the kind of data that we would like. So, for example, I would like to know detailed data about referrals—referrals generated within the system and where they go. I've got some data on that right now—we're getting better—but I'd like to be able to get a report every month. I can't do that. I think that I'd like to just be able to print a report every month that does that. So I think we have the ability to get some indirect things; and insights it's the particular aspect we're looking at. In general, I think the goals are pretty well aligned with what we're trying to…what we're doing with the Balanced Scorecard. And with the things we talked about. I do worry that we compromise on those goals because of our inability to get the exact data we want; our Information technology aren't perfect, etc.

If you had to rate overall the effectiveness of the performance measurement system, how would you rate it?

Somewhat effective. It's because I can't get what I need, what I want. We don't have the exact data that we want. I would say though that it's somewhere between somewhat effective and effective. At least I know that internal referrals are an issue. I'm talking to people about it all the time. I'm banging the drum on that a lot. I think it's having an effect. I'd just like to prove it a little better that's all.

Can you tell me a little bit about the first decision to adopt Baldrige?

We began to look at various performance improvement models or modalities. And there were lots that we looked at. The interesting thing was that it was being driven mostly by the physicians. So we need to do research Baldrige, the Baldrige criteria and successes, that was all done by someone at a Butler—Lisa David. She does a lot of quality work. She gave a presentation at the Quality Council about Baldrige as well as a number of other ones. I forget the ones that she actually talked about; one was an industry model, Magnet, and there were several others. I think the Quality Council felt that Baldrige would fit us best and was the best way. From there it actually went to the board quality committee—quality counts for the board—it went to the board quality committee, and the board quality committee looked at it and said this is very good. Then we had a retreat with GPS, and this occurred within a two- or three-month period. And then we had the retreat with board members present, with medical staff, administration, and Susan described the overall process and the benefits for the hospitals that have done it. And finally it went to the board—it went to the full board—they voted to adopt it as a formal process. So that was good, and I think that what was good about it was it went through multiple parts of the organization and everybody felt involved with the decision. It wasn't strictly a decision that was made at ELT [Executive Leadership Team]. I don't remember if Lisa presented her presentation at ELT, she may have. But I…but I don't recall that specifically. But it was definitely something that everybody at multiple different levels felt involved in the process. And I think the retreat was very helpful. The presentation by Susan was very helpful. It was good.

Let me ask you, how long did a process take?

I would say it took three or four months.

When the process to adopt Baldrige started, do recall in making this decision any internal data or internal performance measures that were used that sort of said from the physicians reason to physicians yeah this is definitely something we needed new? No. I don't remember that at all. I don't remember looking at that; we just knew we needed the opportunity for improvement quickly. We said listen, the Baldrige framework would help us with this. I mean we were in the quality committee, we certainly worth the time reviewing a lot of data. Patient satisfaction data, quality scores data, things like that. And they were weak. We knew there was a weakness in the data; that's what led to the question of this kind of framework. It was the interests in this kind of framework. But I can't say. I would say there was one thing that perhaps was discussed as much as the Baldrige framework, and that was patient satisfaction scores across the system, which were quite poor. I do remember one of the Quality Council meetings that did come up—right around the time that the Baldrige framework was discussed or surely thereafter—so I suspect if we had a transcript of those early meetings, it would be patient satisfaction scoring. But beyond that I can't think of anything else.

So since that decision has been made to formally adopt the Baldrige framework and the work has begun, how would you characterize the satisfaction of the organization with the decision?

It's difficult to say. So one of the concerns–and people always talk about it—is how are things connected to Baldrige. I know that people claim to be very enthusiastic and are behind it. I would say that I have seen some objective information early on that people are enthusiastically behind it. The workforce development group, I've had a couple of each of them, and they seem to be very, very involved in this process—very enthusiastic about it. I think that there are certain areas where people are clearly enthusiastic and everybody espouses enthusiasm for. But I think that knowledge is driven by the fact the top team is enthusiastic about it, but you never really know for sure those things. But I would say that the enthusiasm was very high at the beginning. It continues to be high—and now probably more legitimately high—based on people developing their own work at specific areas.

Let's talk a little bit about the Blue Cross Blue Shield partnership, your involvement and information used to make the decision?

I think it's no secret the relationship with a lot of health systems with Blue Cross, the major insurance provider in the state, would not be great going back three, four, or five years. We considered withdrawing from the plan one point. There's a lot of

"shoot-out at high noon" stuff that came out with Blue Cross over the last 20 years. I think that, however, with the arrival of the CEO, and it was an incremental improvement, the CEO of Blue Cross. The CEO of 10 years ago, my first, came here as a person who was not very highly regarded by the payers, by the clinical side, by the industry. He was somebody who was an executive and not very well liked. Certainly his compensation became an issue publicly. I think Blue Cross bought his house; it was very questionable. When he left, then came another CEO, about six or seven years ago, that really began to put greater emphasis on primary care and the physicians, and he worked better with the insurance commission. An incremental improvement, but his downfall in our eyes was that he built a building—which we joke about. The building is in downtown, in the center of the city as you know—'which floor do the endocrinologists pay for?', those kinds of things. That was really viewed as a real negative, and ever since then I've not been sure if the building was needed or not, but the case he built, it was like $100 million building. It was a beautiful building, but… So this guy comes from another insurer and is a completely different mindset. He wants to work with the hospitals, with us; wants to, as you expect of someone who came from Kaiser, become very interested in population health and global payments and things like that. So very impressed with him, and he and Dennis from the outset had a great relationship. As they begin to meet each other, they were both knew, they had a great relationship, and Dennis came back to the ELT and started to talk about the possibility of forming some type partnership with Blue Cross that really gave us someone that we can work with to help with the payment modalities. And I would say that kind of the decision-making process was, you know, it was a little bit, I don't remember ELT ever voting on. I don't remember ELT at a meeting ever voting on that. It would be included in the updates.

You were specifically consulted on this decision?

I was involved in the decision to proceed forward with the development of global payments and new projects, the three main projects, obstetrics/gynecological bundle and behavioral health bundle. But I can never remember coming down to asking what people think about this. I never remember that decision being asked. I remember it being, 'he wants to partner, I like it very much, let's work together.' There was no one that I thought would be opposed. I never remember the decision they brought to ELT. For example, it never came in front of the ELT to part with Blue Cross because they were so disliked by everyone around here. So it was just that there's a visionary guy now taking over, let's work with them. Now how we can work them? That was a different story. Should we do a Medicare advantage, what about

an OB/GYN bundle or what about a behavioral health bundle. Those issues were discussed extensively. And sort of after the decision had been made to have a strategic partnership with them, how we partner with them was something that was discussed at length. But basically that decision was taken as a given I thought.

Was it any internal information that was used as a basis to say yes, we need this partnership?

No, I don't remember that at all. Except to say we knew that they were our single largest insurer. Everybody around the table knew they were the single largest commercial payer. The relationship had been bad; we wanted to make it good. But I cannot remember a single data point; I cannot remember looking at any internal data. One thing we did do is, recently, looked at the internal data from the health plan, and at the time it was not so great in terms of its utilization and the performance of its own self-insured population. So, but I don't ever remember analyzing data at length. I would say some of that probably happened because of the Senior Vice President of Health Plans, he's the lead contract person, he I'm sure looked at a lot of the necessary data, but I don't recall other members of the senior team doing that.

How long did it take to get that whole—from the time he learned of it for the time the partnership was finalized on all the details—partnership agreement place?
A little under two months.

What do you think the satisfaction is?

I think pretty high the given example, another plan recently expelled a number of the state's patients that the country physicians for reasons that we think have to do with illnesses and gravity of the illnesses of patients, utilization nothing to do with quality. All of a sudden we were looking at our hospitals in our medical staffs and sometimes more than a third of the patients, 30 of the physicians particular primary care doctors in the network. So what we were able to do, Blue Cross and this is separate from the bundle payment arrangements, what we were able to do was to work and get patients transferred to their product during the open enrollment period. So their Medicare advantage increased. From their standpoint, that's a risk because you know the other provider isn't letting these doctors go because they're good risks it's probably cost them a lot of money. So for Blue Cross to take on, we thought that was

great. That to me has been so far the biggest part of the process. Now we've also had a lot of discussions around these three bundle projects. Of the three, the one that has made the most progress first I'd say was the behavioral health bundle. We're looking at the top users of behavioral health care in the Medicare advantage project, trying to design special plans for them. That actually is where we need help and running. The Medicare advantage project will start in the next couple weeks, and that's a large project where we will have a certain number of covered lives and will be responsible all because we care for those particular patients. That's we great discussion. Integrate great project. We need almost need to discuss on a more frequent basis as we go through this with them, as we go through the logistics, the details on designing this, payment mechanisms. I would say the one that's been a disappointment is the OB/GYN bundle. But the truth of the matter is, it's really our fault because we really didn't have the doctors on board, and I will go to detail. The staff at Women and Infants was divided, the community docs and academic docs, there's not a lot of love lost between medical staff and the administration there. So we didn't have the physicians at the table early on from all sides. We fixed that now everything isn't stood up yet because we didn't do a great job, not Blue Cross.

But overall pretty satisfying.
Yes, I would say it has been. And it's very interesting, for example, that the relationship has small little dividends. For example, we hired several surgeons, and for various reasons we couldn't get their credentialing done on time. I thought it's because of the contracting perspective for the relationship and the next day they were on the Blue Cross. I think usually that's a three-month process. That's huge. So those kinds of things make a huge difference.

So let's talk about this last question and then I have a few questions on the industry in general. Memorial Hospital—did you talk about the decision, your involvement, and what data you used to help make that decision?
I was involved with Memorial. When they sent out their request for proposals, or request for interest it was; they called it a merger, but it was really an acquisition. I was involved from the beginning; of course, there was the competition and us. The decision to proceed with them was never in doubt. As soon as they put out their proposal, it came to the ELT, and we said we have to do something like this because if the competition gets Memorial with all those family medicine doctors, the resident program, what's to become of us? And so it was a big deal for us and from the outset we wanted to succeed with that. The process by which we succeeded was put together very patiently; there were plans on how we would incorporate Memorial

into CNE. The fact that they would lead primary care. That they would have the same governance rights as the founding members and the same number of board seats on the board. Made a whole series of presentations that went very, very well. I would tell you up until the last week we didn't know we were going to win. The folks at our competitor were so confident they would. They were as shocked that we won, as we were surprised that we did. But the actual decision itself was almost immediate. We cannot let this go to the competition. That took a couple hours.

What information did you use to make that decision?

We had a lot of data on Memorial, mostly financial data. It was interesting because the whole process took over year. The financial, that itself wasn't great. But we have hospital financial data, because they were part of the university system, data about their residency program, their family medicine program, and internal medicine. And we had consultants on both sides; in any case, they were separate consultants on both sides, and so once we were selected as the party to go forward with, exclusive negotiations began and we got more data. I would say that before they selected us as exclusive partners, we had the ability to ask questions back and forth, request data, so we requested clinical utilization data and what their relationship with doctors was. But the detailed questions of the medical staff and the clinical staff, and likewise from a facilities standpoint, and they would respond to varying levels of completeness. So that process of providing the data was a give-and-take process. Obviously there are certain things, certain data that you can't see, such as strategic planning and regulatory until the deal's close, but we were pretty confident with the data. Now I don't think the data was totally accurate, but going through the process we were pretty confident.

So what's the satisfaction with this decision?

So… If you asked right now would we do it again? I think there are people that would not do it again. The financial performance wasn't what we hoped. And it turns out their large primary care center, with their docs, was vastly underproductive. This was information we were not able to get from a regulatory standpoint. Their doctors there had a tough week: a primary care doctor's work one day a week, and with residents another day, and free the rest of the week. So they were vastly underproductive; they have a modest number of patients in their whole panel at that large primary care center. Maybe we could have gotten some of that data in advance, and if we had to do it over again, I would ask those questions such as what size it sent could've been allowed. I would say our attorneys were very conservative

about what we could ask. I would say our internal attorneys were very conservative in my mind to conservative, but nevertheless, that's no excuse. Also, reputation is not that highly regarded, particularly within the Latino community. We look at the community in that part of Rhode Island. In the state 25% of the population speaks Spanish; they often have situations where they don't have interpreters. So there are things we would've done differently. I would do it again if we had to do it over simply because it did prevent the competition from getting the family medicine practice. We hired last year eight primary care residents from their residency and will hire another eight or nine this year. So the fact that they are part of our system helps us; in primary care the fact that they're part of us has helped us with primary care recruiting, and will pay dividends down the road. Whether we keep them a full-service hospital is still up in the air right now, but we are required to do so. I think there is probably a split in leadership about whether you would do it again.

6.9: Project 3 Questionnaire Questions and Instrument

1. Purpose

Thank you for taking the time to provide your input regarding Care New England's performance measurement system. Your input will help us understand how well the system is working and facilitate targeted improvements. This survey consists of eight (8) multiple choice questions and one (1) free response question. It should take no more than two minutes to completed. All responses are confidential. Thank you in advance for your time.

***1. Based upon your experience, please rate the level of environmental change the health care industry is currently experiencing.**

- ◯ 1 (Very Low)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Very High)
- ◯ Don't Know

***2. Please identify the top three drivers that are creating environmental change.**

- ☐ Cost Pressure
- ☐ Policy Changes (e.g. Accountable Care Act)
- ☐ Demand for Better Value
- ☐ Payment Reform (not related to Accountable Care Act)
- ☐ Quality and Performance Information Transparency
- ☐ Industry Consolidation/Systemization
- ☐ Technology Change
- ☐ Market Competition
- ☐ Growing Number of Uninsured
- ☐ Entrance of Private Equity
- ☐ Scarcity of Talent
- ☐ Other (please specify)

***3. From your perspective, please rate how focused senior management's attention is on the major drivers of environmental change?**

- ◯ 1 (Poorly Focused)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Highly Focused)
- ◯ Don't Know

***4. Based upon your knowledge, how well aligned are the objectives on the Balanced Scorecard to the major drivers of environmental change?**

- ◯ 1 (Poorly Aligned)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Well Aligned)
- ◯ Don't Know

***5. Based upon your knowledge, how well aligned are the measures on the Balanced Scorecard to the major drivers of environmental change?**

- ◯ 1 (Poorly Aligned)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Well Aligned)
- ◯ Don't Know

***6. Based upon your knowledge, how effective is the Balanced Scorecard in terms of measuring organizational performance?**

- ◯ 1 (Highly Ineffective)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Highly Effective)
- ◯ Don't Know

***7. From your perspective, how frequently is the Balanced Scorecard reviewed by leaders at CNE?**

- ◯ 1 (Not Frequently)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Very Frequently)
- ◯ Don't Know

***8. Based upon your knowledge, how effective is Care New England's overall performance measurement system (includes all measures CNE uses—financial, operational, clinical, quality, and Balanced Scorecard)?**

- ◯ 1 (Highly Ineffective)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Highly Effective)
- ◯ Don't Know

9. In your opinion, what is the most significant change that can be made to improve the effectiveness of how Care New England measures performance currently?

2. Thank You

Thank you for your participation in this survey. The information will be passed through the Baldrige Category 2 and 4 team's when complete.

6.9: Care New England Newsletter Excerpt

carenews

together we are transforming the future of health care

december 30, 2013
volume 3 | issue 52

In this issue:

Good day!

This is the week where we typically make our resolutions for the New Year. Some of us vow to lose weight, get into a regular cycle of exercise, stay in better touch with friends, or find more balance in our lives.

Organizations, too, make their own type of resolutions. For Care New England, we vest our hopes and aspirations for the year in our Balanced Scorecard (BSC). Alignment around a BSC is a hallmark of quality in top-performing organizations around the world. This is the third year with this tool, and, as with most things in life, we get better with more practice and experience. I believe we are truly finding the sweet spot in arriving at the right number of objectives with the right degree of difficulty and the right kind of measures to gauge our success.

We use the annual BSC to make incremental progress toward the 2018 destination metrics found in our long-range strategic plan, and once again we are focusing on five goal areas:

- **Clinical Excellence:** Consistently deliver clinical excellence across our continuum of services
- **Physician Partnership:** Align with independent and employed physicians to manage care and deliver exceptional value to our patients and community
- **Strategic Partnerships:** Develop strategic partnerships to assure that we play a meaningful role both in high quality regional delivery systems and with top-ranked national networks
- **Academic and Research Excellence:** Strengthen and unify our academic teaching and research missions across Care New England
- **System Strength:** Build overall system strength by ensuring that we demonstrate governance, operating and financial excellence.

continued

continued

Supporting these overall goals are specific initiatives. For the fiscal year that began on October 1, we have articulated 22 initiatives. Each of these includes an objective (what we must accomplish), definition (what we must specifically accomplish), measure (how we will assess performance against the objective), target (level of performance we must achieve), initiative (the action plan that will drive us to the target) and accountability (the executives responsible). Didn't I say we were getting better at this?

Thanks go out to Strategic Planning Committee of the Care New England Board and to our Executive Leadership Group for the efforts that have gone into the development of this roadmap, and particular kudos are extended to the Measurement Work Group, one of the committees formed as part of the structure for our Transforming Together journey, which has developed a discipline around performance metrics and has contributed so meaningfully to this year's BSC.

As we cascade the specific initiatives contained in our BSC across all of our management teams, we will be communicating the precise objectives that will enable us to achieve our system strategy. Most everyone across all of Care New England will have an opportunity to impact our achievements. Whether you teach medical students, provide nursing care to our patients, help get out our bills, or answer the phones, you each contribute to our overall system performance.

Let's all resolve to do the best possible job in 2014. And, if our accomplishments in 2013 are any indication, I am very confident that the year ahead will bring us tremendous success!

Please accept all my best wishes for a Happy New Year! Enjoy time with your friends and family, and for all of those resolutions in your personal life, good luck!

Sincerely,

Dennis D. Keefe

Dennis D. Keefe
President and Chief Executive Officer

Program in Women's Oncology earns accreditation

The American College of Surgeons Commission on Cancer recently announced that the Program in Women's Oncology at Women & Infants Hospital of Rhode Island earned a three-year accreditation with commendation. The announcement came as a result of a successful site visit in late September, according to Margaret M. Steinhoff, MD, chair of the hospital's Cancer Committee.

"This accreditation with commendation is testimony to the quality of care available for women with cancer at the Program in Women's Oncology, and the dedication and passion of the staff working here," Dr. Steinhoff notes.

The Commission on Cancer (CoC) lists five elements that are key to the success of a cancer program:

- State-of-the-art pretreatment evaluation, staging, treatment and clinical follow-up for cancer patients with primary, secondary, tertiary or end-of-life care
- A Cancer Committee that leads the program through setting goals, monitoring activity, evaluating patient outcomes and improving care
- Cancer conferences (Tumor Board at Women & Infants) that provide a forum for patient consultation and contribute to physician education

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